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The Virginias,

A Mining, Industrial & Scientific Journal,

Devoted to

The Development of Virginia and West Virginia.

Edited and Published by

Jed. Hotchkiss,

Consulting, Mining and Civil Engineer.

Volume V, 1884.

Staunton, Va.

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The Virginias.

Serial No. 49. Vol. V.—No. 1.

Staunton, Va., January, 1884.

Jed. Hotchkiss, Editor.

The Index for 1882 to *The Virginias* is now printed and ready for mailing to any one expressing a desire for it by card or letter.

The rules for Spelling adopted for *The Virginias* some time ago will be rigidly adhered to in this volume. No letters will be doubled unless they form part of the suffix or grammatical termination added to the simple or radical form of the words used. We do not believe in doubling letters when nothing is gained by so doing but the maring of the simplicity of our noble language.

At the National Agricultural Convention to be held at the Grand Central Hotel, New York city, Feb. 6 and 7, Senator John W. Johnston of Richmond and Col. S. S. Bradford of Culpeper, Va., will deliver addresses.—Such gatherings of informed and intelligent men from different parts of the Union, are greatly to be commended, since correct information concerning the condition and wants of the different parts of the country are given a wide publicity in the full reports of the great daily newspapers.

The Sun Almanac for 1884.—As the Baltimore Sun, one of the best newspapers published, is among the most welcome of our daily visitors—giving in brief and in detail, as circumstances demand, the very life and spirit of the times,—so the Sun Almanac is one of the most welcome of our annual visitors, coming promptly with the opening year and filled with matter useful for daily reference. This 96-page almanac is an appropriate supplement to The Sun and as such it is presented to every subscriber to that greatly esteemed journal.

Cincinnati Iron Market Report.—Under date of Jan. 21, 1884, E. L. Harper & Co., of Cincinnati, Ohio, send the following report:

The business of the month has been fairly active, numerous liberal orders have been booked. Several large transactions are not consummated at this writing because of the disinclination of certain furnaces to meet figures offered by buyers, they having resolutely determined to pile up their iron rather than sell at losing prices. The elements of the market are healthful From reports there appear to be superfluous stocks of visible cereals, and the planted crop is in excelent condition. The car-works and agricultural implement makers anticipate and are preparing for an active business. Steel rails are in active demand, and prices have advanced about $2.50 per ton. The stock of crude iron is not large, and with ample confidence, and an abundance of money a revival of traffic should be reasonably looked for, and a prosperous year indicated. The only feature of uncertainty arises from apprehensions of a tariff agitation which are insufficient to neutralize the substantial facts and well grounded hopes for early "good times"—We quote as prices current, on 4 months:

Foundry.

Virginia neutral coke, No. 1, at	$19.00	and	20.00.
" " " No. 2, at	18.50	"	19.00.
Southern car-wheel, strictly cold blast, at	26.50	"	27.00.

Gray Forge.

Virginia neutral gray forge, No. 1, at	$17.00	and	18.00.
Virginia cold short, No. 1, at	16.50	"	17.00.

The Climatic Temperatures of the Virginias.

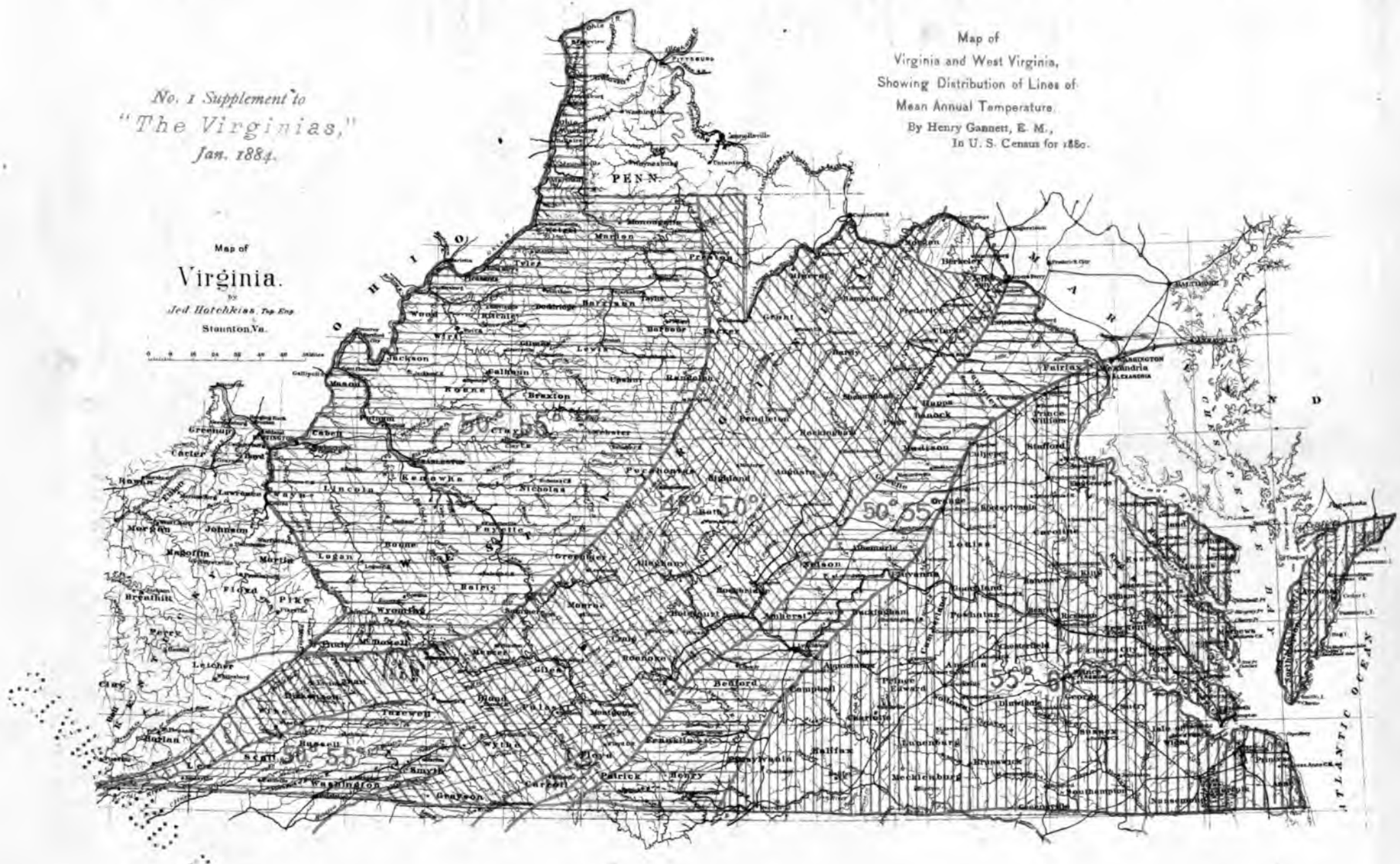
If one knows the conditions of temperature, the laws of heat, that prevail in any region, he may be said to understand the climate of that region, since temperature is the fundamental phenomenon of climate. All climates are controlled by the distribution of heat, and a knowledge of the heat extremes and means of any region is necessary if one would know the adaptability of that region to man's bodily health and vigor and to the various vegetable and animal products upon which he depends for sustenance and profit. A difference of 4 or 5 degrees in the *mean spring temperature* of this locality, Staunton, Va., and that of the vicinity of Norfolk, Va., makes a difference of from 15 to 20 days in the ripening of strawberries, and a similar difference of *mean summer temperature* makes the growing of sweet potatoes and other sub-tropical products successful and profitable on the Eastern marine plains of Virginia and not in its Great Valley.—For these reasons we have chosen the subject of the Temperatures of the Virginias as the first subject to treat of and illustrate in a series of papers on these states in *The Virginias* for 1884.

In the Population volume of the complete Census of 1880 there is a chapter on the Distribution of population in the U. S. in accordance with temperature, illustrated by five temperature maps of the U. S. colored in zones. On pages 2, 3, and 13 of this number will be found the temperature zones, that cross Virginia and West Virginia, of three of these maps transfered (as accurately as can be from a small scale map to one much larger) to carefully prepared maps of Virginia and West Virginia.—We reproduce these maps as they appear in the census volumes and as they will go to the world that we may comment on them as, of necessity, they could not be commented on in the discussions of the census volumes, which are general in their character and applicable to the United States as a whole, and to correct some of the impressions that they, perhaps unavoidably, convey. Fullness of detail, in special directions, concerning the state, can only be obtained in a work under state control; hence the value of the intermediate census of 1885 that we have urged our legislature to provide for. It is due to Mr. Henry Gannett, the Geographer of the census, who prepared the maps of the census volumes, for us to say that we consider his work admirably and conscientiously well done; the limitations of publication imposed on him limited the range of his presentations. Our criticisms are not to be understood as in derogation of his work. They are an attempt to supply for the Virginias the omissions, so to write, that he was compeled to make.

The chapter above refered to opens as follows:—"Our country extends from the tropics north across the temperate zone, and from the sea-level to an elevation of over 14,000 feet, an elevation which carries with it an arctic climate. The mean annual temperature ranges over more than 40° F., while the extremes of recorded temperature run from 55° below zero up to a maximum above 115°. The mean temperature of the hotest month of the year, July, ranges from below 60° to above 90°, while the mean temperature of the coldest month ranges from zero to more than 65°. Were the country a plain, the mean temperature of the year would be almost purely a question of latitude; a difference of elevation, however, especially when it takes the form of a mountain range, causes a deflection southward of the isothermals, an abrupt rise of about 300 feet of elevation implying a decrease of annual temperature of one degree. Thus we find that the Apalachian system causes a very marked deflection southward of the isothermals. On the plains, however, where the upward slope is very gradual, it is to be noted that the elevation causes little or no deflection

No. 1 Supplement to
"The Virginias,"
Jan. 1884.

Map of
Virginia and West Virginia,
Showing Distribution of Lines of
Mean Annual Temperature.
By Henry Gannett, E. M.,
In U. S. Census for 1880.



southward of the lines of temperature, the plains and plateaus generally having a mean annual temperature nearly or quite as high as points in the same latitude in the Mississippi valley or on the Atlantic coast. The temperature of the great western plains and plateaus is, however, modified locally to a great extent by the exposure to west and northwest winds which have an unbroken sweep in some places for hundreds of miles, acquiring tremendous force."

Map No. 1, page 2, shows the Distribution of lines of Mean Annual Temperature. The map of the United States from which it is taken has on it 11 belts or zones of mean annual temperature, ranging from a mean of 5° to 10° to one of from 55° to 60°, each varying from the other by differences of 5°. But four of these zones appear on the map of the Virginias, and one of these, that of 40° to 45°, occupies but a small space on the Floyd-Carroll-Grayson plateau.—The engraver should have put the horizontal bars of 50°–55° across Berkeley county, W. Va., and vicinity, where the map is left uncolored.

The mean annual temperature zones of the Virginias, as shown on map No. 1, are:

First, that of 40° to 45°, a northward tongue from the high, Blue Ridge plateau of North Carolina, a region all more than 4,000 feet above sea-level, into Virginia's part of the same plateau in Floyd, Carroll and Grayson counties.—The zone is placed too far to the east and extended too far to the north. It should embrace a portion of Washington county. A zone of this temperature should appear in Randolph and Grant counties, W. Va., on the high plateau of the sources of Cheat and Potomac rivers, and on the Great North mountain belt west of The Valley from Montgomery to Shenandoah counties, Va.

Second, that of 45° to 50°, ruled in N. W.-S. E. bars, including nearly all the Blue Ridge, Great Valley and Apalachian portions of these states, and part of what might be called the plateau region of Trans-Apalachia in West Virginia.—It includes very considerable areas in the Valley, in the basins of the James and the Roanoke, in Roanoke, Botetourt and Rockbridge counties, and in the basin of the Shenandoah in Clarke, Warren, Page and Rockingham that properly belong in the next zone.

Third, that of 50° to 55°, ruled in E.-W. bars, which covers all of Piedmont, a part of the southwestern ends of The Valley and Apalachia and a small portion of Midland in Virginia and all of West Virginia lying westward of the second zone, as well as Berkeley county and vicinity in The Valley.—This zone in Virginia ought to have its eastern boundary, from the Rappahannock southward, moved westward to the crest of the Coast Range mountains, and many of its valleys should be penetrated by arms from the zone lying east of it. As stated above other portions of The Valley than its extreme southwestern have this mean annual temperature. A number of the river valleys of West Virginia, especially those of the lower Big Sandy, Guyandot and Great Kanawha, belong in the next zone rather than in this.

Fourth, that of 55° to 60° which is represented as including all of Tidewater and very nearly all of Midland, Va.—The extreme southwestern part of Virginia, much of the low, eastern marine plain, the region of north-and-south perninsulas, ought to be included in a warmer zone, that of 60° to 65°; Virginia's cotton, peanut and early fruits and vegetables country.

It appears from the census returns that 98 per cent of the population of the United States lives in the zones of the mean annual temperature between 40° and 70°. As the Virginias include these favored and naturally selected zones, and these only, it follows that they have within their limits the desirable mean annual temperature localities of all the country.

The greatest absolute gains in population in the U. S. during the 1870–1880 decade were in the regions of medium mean annual temperature, zones 50° to 55° having made the greatest gains in density of population. Approximately, states the census report, the mean annual temperature of the U. S. is about 53°F.

Over 87 per cent of the foreign population of the country is found in the zones between 40° and 55°, and over 93 per cent of the negro population is found in those between 50° and 70° of mean annual temperature. So the Virginias have climatic conditions suited to the choice of both these classes of population.

The cotton producing regions of the country are those having a mean annual temperature above 55°; tobacco those between 50° and 60°; and sugar those above 70°.—The prairie regions of the Mississippi valley are stated to lie almost entirely in the zones below 55°

An inspection of the mean annual temperature map of the United States shows that there is no state in the Union except California that has as wide a range of large areas of the most desirable conditions of mean annual temperatures for man's wants as the Virginias. It follows that none has a wider range for desirable vegetable and animal products.

Map No. 2, on page 4, shows the Distribution of the Mean Temperature of July, the hotest month of the year, in the Virginas. According to this map, colored as it is to correspond with that of the census volume, all the territory of Virginia, with unimportant exceptions, has a mean temperature of between 75° and 80° during the month of July, placing it in the large zone that includes, with slight exceptions, all of North Carolina and Kentucky, and most of South Carolina, Tennessee, Illinois, and Missouri, and large areas of Kansas and Nebraska.

The western part of West Virginia, about one-third of the state, is embraced in this same zone of 75°–80°, while the remaining two-thirds is in a southward projecting arm of the great zone of 70° to 75° that includes most of Pennsylvania, Ohio, Indiana and other states to the northwest.

We question very much the presentations of this map. Its generalizations do not do justice to the July climate of the Virginias. The zone of 75°–80° embraces by far too much of Virginia and rather too much of West Virginia.—There are large areas in both of these states that should be colored for the next lower range of July temperature, that of 65°–70°, which is shown on the map of the whole country as embracing northern and northeastern Pennsylvania, the larger portion of New York, nearly all of Vermont, New Hampshire and Maine, the northern half of Michigan, etc. These states also have table lands of considerable extent that have the July mean temperature of a still lower and cooler zone, that of 60° to 65°; the zone in which the Adirondack and Catskill regions of New York and the extreme northern portion of Maine (and these only of all the territory of the United States east of the Cordilleras, or Rocky mountains) are located. These additional facts and proper limitations of those shown on this map will appear on a new map of the Virginias "Showing the distribution of the zones of the mean temperature of July" that we will publish hereafter.

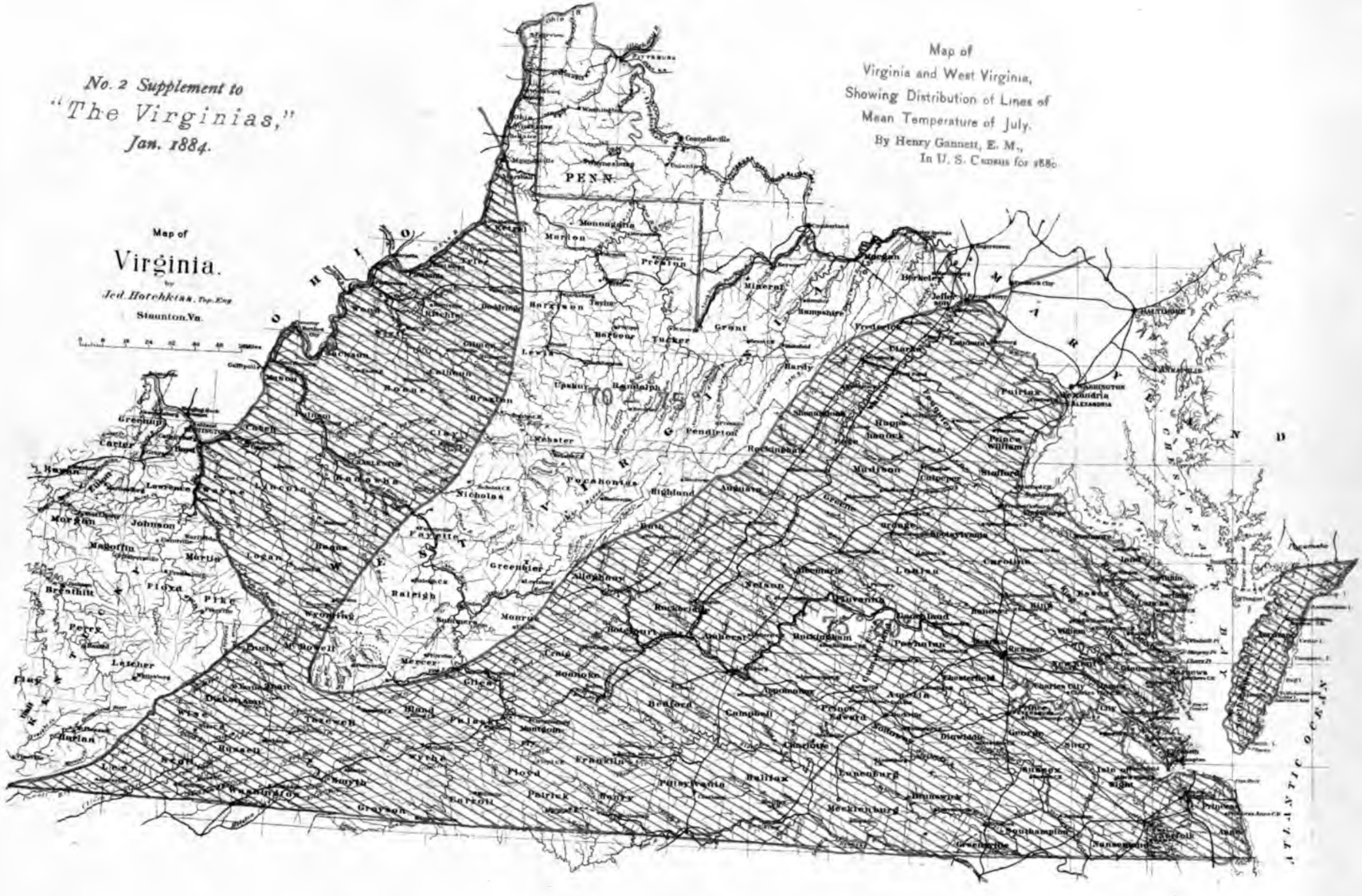
Map No. 3, on page 13, shows the zones of Mean Temperature for January, the coldest month of the year. Virginia is presented as crossed by four zones of temperature as follows:

First, that of 25° to 30° which includes the western half of Piedmont, all of the Blue Ridge and The Valley and most of Apalachia. Its area is too large and it includes areas that belong to warmer zones.

(Continued on page 14)

No. 2 Supplement to
"The Virginias,"
Jan. 1884.

Map of
Virginia and West Virginia,
Showing Distribution of Lines of
Mean Temperature of July.
By Henry Gannett, E. M.,
In U. S. Census for 1880.


Map of
Virginia.
by
Jed. Hotchkiss, Top. Eng.
Staunton, Va.
PENN.
OHIO
MARYLAND
ATLANTIC OCEAN
Monongalia
Marion
Preston
Harrison
Taylor
Barbour
Tucker
Grant
Mineral
Hampshire
Morgan
Berkeley
Jefferson
Frederick
Clarke
Loudoun
Fairfax
Alexandria
Fauquier
Prince William
Stafford
Rappahannock
Culpeper
Madison
Orange
Spotsylvania
Caroline
King George
Westmoreland
Northumberland
Lancaster
Essex
King William
King and Queen
Gloucester
Mathews
Middlesex
Richmond
Northampton
Accomac
Nelson
Louisa
Hanover
Henrico
Chesterfield
Goochland
Fluvanna
Buckingham
Amherst
Appomattox
Prince Edward
Cumberland
Powhatan
Amelia
Nottoway
Dinwiddie
Greensville
Sussex
Surry
Isle of Wight
Nansemond
Norfolk
Princess Anne
Southampton
Brunswick
Mecklenburg
Lunenburg
Halifax
Charlotte
Campbell
Bedford
Franklin
Pittsylvania
Patrick
Henry
Floyd
Carroll
Grayson
Wythe
Smyth
Washington
Russell
Tazewell
Bland
Giles
Pulaski
Montgomery
Roanoke
Craig
Botetourt
Rockbridge
Alleghany
Bath
Highland
Augusta
Rockingham
Shenandoah
Page
Warren
Clarke
Frederick
Hardy
Pendleton
Randolph
Upshur
Lewis
Gilmer
Braxton
Webster
Pocahontas
Nicholas
Greenbrier
Monroe
Fayette
Raleigh
Mercer
Summers
Wyoming
McDowell
Mingo
Logan
Boone
Kanawha
Putnam
Mason
Jackson
Roane
Calhoun
Clay
Gilmer
Wirt
Wood
Ritchie
Doddridge
Tyler
Pleasants
Wetzel
Marshall
Ohio
Brooke
Hancock
Tyler
Pleasants
Wetzel
Marshall
Ohio
Brooke
Hancock
Greenup
Carter
Boyd
Lawrence
Johnson
Magoffin
Martin
Floyd
Pike
Breathitt
Perry
Letcher
Harlan
Bell
Knox
Clay
Owsley
Lee
Wise
Dickenson
Buchanan
Tazewell
Russell
Wise
Lee
Scott
Washington
Smyth
Grayson
Carroll
Wythe
Bland
Giles
Pulaski
Montgomery
Roanoke
Franklin
Pittsylvania
Halifax
Patrick
Henry
Floyd
Bedford
Campbell
Appomattox
Prince Edward
Cumberland
Powhatan
Amelia
Nottoway
Dinwiddie
Greensville
Sussex
Surry
Isle of Wight
Nansemond
Norfolk
Princess Anne
Southampton
Brunswick
Mecklenburg
Lunenburg
Halifax
Charlotte
Campbell
Bedford
Franklin
Pittsylvania
Patrick
Henry
Floyd
Carroll
Grayson
Wythe
Smyth
Washington
Russell
Tazewell
Bland
Giles
Pulaski
Montgomery
Roanoke
Craig
Botetourt
Rockbridge
Alleghany
Bath
Highland
Augusta
Rockingham
Shenandoah
Page
Warren
Clarke
Frederick
Hardy
Pendleton
Randolph
Upshur
Lewis
Gilmer
Braxton
Webster
Pocahontas
Nicholas
Greenbrier
Monroe
Fayette
Raleigh
Mercer
Summers
Wyoming
McDowell
Mingo
Logan
Boone
Kanawha
Putnam
Mason
Jackson
Roane
Calhoun
Clay
Gilmer
Wirt
Wood
Ritchie
Doddridge

Coal and Coke Traffic of Ches. & Ohio Ry., Dec., 1883.

General Manager C. W. Smith, sends *The Virginias* the data for the following statement for the total output and distribution of coal and coke received from mines on line of C. & O. Ry., (including fuel on Lexington division) during Dec., 1883, and December, 1882, in tons of 2,000 lbs., compiled by fuel agent, C. M. Gibson:

Kind.	1883.	1882.	Increase.	Decrease.
Cannel	73	1,650	....	1,577
Gas	41,869	35,699	6,170	....
Splint and block	8,807	8,488	319	....
New River, &c	36,105	29,026	7,079	.....
Coke	6,500	8,073	....	1,573
Totals	93,354	82,936	13,568	3,150

This shows a net increase of 10,418 tons, or about 12 per cent, in Dec., 1883, over the same month of 1882. The movement for Nov., 1883, was 82,500 tons; so there was an increase of 10,854 tons in the December over the November traffic, a gain of about 12 per cent.

The distribution of the above was as follows:

	1883.	1882.
1. To Ches. & Ohio Co. for its own use	26,002	26,101
2. To Huntington, for West via Ohio river	696	646
3. On Elizabethtown, Lexington & Big Sandy RR	3,649	5,246
4. On Ches. & Ohio Ry., excepting Richmond.	12,975	14,819
5. To Richmond & Alleghany RR. at Clifton Forge.	1,093	2,140
6. To Valley RR. of Baltimore & Ohio at Staunton.	.....	260
7. To Shenandoah Valley RR. at Waynesboro	217	2,390
8. To Va. Midland Ry. at Charlottesville	5,744	5,355
9. To Richmond, Fredericksb'g & Potomac RR. Junc.	455	636
10. To Richmond for consumption including tugs, &c	11,382	11,870
11. To James River wharves for shipment	.....	3,686
12 To Newport News { Consump'n includ'g tugs &c,	908	277
12 To Newport News { For shipment	30,233	9,510
Totals	93,354	82,936

The striking features of this distribution are the decrease in deliveries to Shenandoah Valley and Richmond & Alleghany railways, doubtless the result of the opening of the Flat-top coal mines, and the very large increase—over 216 per cent—in the shipments from Newport News, showing how rapidly that port is coming into favor as a coaling station.

The following table presents the progressive traffic from January 1 to Dec. 31, inclusive, for 1883 and 1882:

Kind.	1883.	1882.	Increase.	Decrease.
Cannel	21,013	30,910	.....	9,897
Gas	373,371	345,905	27,466	.....
Splint and block	103,327	124,422	.....	21,095
New River, &c	405,602	357,744	47,858	.....
Coke	100,786	91,919	8,867	.....
Totals	1,004,009	950,900	84,191	30,992

The net gains of the 12 months' traffic of 1883, over the same time of 1882, were 53,199 tons, or nearly 6 per cent; this gain was shared in by gas and New River coals and coke. The splint and block coals of the Kanawha region are now, as a rule, sent westward by water.

The gains over 1882 were about 8 per cent in gas coals, 14 per cent in New River coals, and over 9 per cent in coke. —It is gratifying to record that *the coal traffic for 1883 reached over a million tons.*

Railway Legislation.—It is very difficult to account for the course that many of the leading journals of Virginia have pursued, both in editorials and admited correspondence, in reference to some of the railway charters that the Va. legislature now in session has been asked to grant or amend. Railway companies—that have contributed more than all other agencies combined, as every observing and well informed man must admit, to develop our resources, build up our towns, introduce new industries and enrich our people, giving things large values that before had no value—when they ask for just such privileges as have been granted, time after time, by our legislature, to companies that never existed and never will exist but in the "Acts of Assembly," are denounced in leaders and in commended correspondence, in language and ways utterly inconsistent with the general utterances of these journals, and, we respectfully suggest, everyway improper and uncalled for,—language well calculated to do the state great harm and to lead those outside of it, who are looking to settlement or investments in it, by urgent and repeated invitation of these same journals, to doubt our sincerity and the advisability of locating or investing where they will be denounced in no measured terms, for doing the very things they have been invited and urged to do. We have complained bitterly, and in some cases justly, that railways have availed themselves of the privileges of their charters for the mere purpose of crossing the state to states and markets beyond, doing nothing to develop or improve the portion of our state they traverse; building sheds and hovels for station houses; making no provision by well-kept and attractive hotels to induce any one to stop and examine the country and see what inducements it can offer to one seeking a home or place of business, in short, taking no interest in anything that will promote the general good of the country along their lines. And yet, when companies that of their own motion have been doing these very things that we earnestly desire to have done,—have promptly constructed and put in every way efficient operation greatly needed lines of railway; have built branch roads to iron, manganese, coal and other mines, and put up the best of freight and passenger houses; have helped to organize companies that have constructed blast furnaces of large capacity, attractive and well kept hotels, machine shops, and thriving villages; and have, through those interested in these railways and allied enterprises, contributed to the building of churches, school-houses, additions to our college accommodations, etc, etc; expending millions of dollars in every part of the state and making it rich and prosperous as it never was rich and prosperous before; when such companies ask for power to enable them to continue to do as they have been doing but in an enlarged and more organized and efficient form, and to do what we have granted dozens of unborn, and still-born corporations the power to do, we at once proceed to denounce these approved benefactors of the state and array these very good things they have done and which we have urged them, with all our power, to do, as reasons why they should not be granted the reasonable privileges they ask.

Let us be consistent. Let us appear before the world as sober-minded, reasoning and reasonable people. The era of our development has but just begun; we need millions of money and thousands of miles of railways for the promotion of that development. Can we obtain these by abusing and calling in question the motives of the capitalists and officials that have proven by results what they can do for us in the upbuilding of our state? We have made an exhibition of ourselves in this matter that is widely spoken of to our discredit. Let us hasten to a reconsideration.—We hope our legislature will grant the full powers that all railways and corporations ask for,—and then wind up the session with *a free railway law.*

The Geodetic position of Covington, Va., we found it very important to have to enable us to give greater accuracy to the new map of the *Virginias* we are preparing as a basis for the new geological map of these states we are now compiling from the notes of the Virginia geological survey by Prof. Wm. B. Rogers, therefore we applied to Prof. J. E. Hilgard, Superintendent of the U. S. Coast and Geodetic Survey, asking that a party might be sent from his office to determine this position. With the usual enlightened liberality of that survey in promoting geographical work a party in charge of Mr. C. H. Sinclair was sent to Covington, in Dec., 1883, for this purpose and below we give the results of its work. Mr. C. W. Smith, General Manager of the Chesapeake & Ohio Ry., liberally gave transportation for the party of observers and its fifteen hundred pounds of instruments over his road from and to Charlottesville.

Mr. Sinclair reports concerning the latitude and longitude of Covington that "The point refered to is the center of the brick pier near the depot, which pier is under the protection of the town authorities."

Latitude of pier, 37° 47′ 16.″55° North.

Longitude of pier, 79° 59′ 37.″9° W. of Greenwich.

This pier is 11 minutes 46.37 seconds west of Washington.

The longitude given is "the mean of three well accordant nights" of telegraphic signaling for time between Washington and Covington; the latitude is the result of fifty observations on fifteen pairs of stars, and Mr. Sinclair makes the limit of error of the result given as 0′.12 more or less.

On the 9-sheet map of Virginia, the official map of the state, Covington is placed in N. Lat. 37° 47′, and W. Long. 2° 59′ from Washington, while the above determination gives it 2° 56′ 35″.5 from Washington; so it is placed on the state map considerably too far west and too far south.

The altitude of the depot at Covington is 1,245 ft. above tide, by C. & O. Ry. surveys.

By magnetic observations made by J. B. Baylor of the U. S. Coast and Geodetic Survey at Covington, June 15 and 16, 1881, the *declination* of the needle was plus 1° 03′.2; the *dip* was 69° 33′.5; *horizontal force* 4.615 British units (viz, the foot, the grain, and the second of mean time), and 0.2128 British Association or C. G. S. units (viz, the centimeter, the gram and the second of mean time); and the *total force* was 13.21 British units and 0.6093 C. G. S. units. The observations were made in the flower garden in rear of the McCurdy hotel.

Metal and Mineral traffic of Chesapeake & Ohio Ry. in 1883.—General Manager C. W. Smith kindly furnishes *The Virginias* the data for the following interesting detailed statement of the metal and mineral traffic of the Chesapeake & Ohio Ry. during the calendar year 1883, in 2000 pounds tons.

1. Pig Iron Movement.

Waynesboro to	Richmond and James River	507
	Nuttall	14
	Huntington	1,705
	Local	24
	Ashland, Ky	176
	Total	2,426
Staunton to	Richmond	15
Goshen (Victoria furnace to	Richmond and James River	3,154
	Newport News	84
	R. F. & P. Junction	99
	Charlottesville	254
	Waynesboro	171
	Longdale	2,937
	Huntington	6,135
	Ashland, Ky	1,786
	Winchester, Ky	1,211
	Lexington, Ky	1,262
	Total	17,093
Longdale furnaces to	Richmond and James River	2,850
	Staunton	946
	Huntington	15,665
	Ashland, Ky	4,179
	Winchester, Ky	155
	Lexington, Ky	261
	Local	81
	Total	24,137
Clifton Forge (Callie fur.) to	Richmond and James River	53
	Staunton	54
	Huntington	363
	Ashland, Ky	693
	Lexington, Ky	10
	Local	730
	Total	1,903
Low Moor furnace to	Richmond and James River	11,166
	Newport News	44
	R., F. & P. Junction	799
	Charlottesville	1,006
	Waynesboro	29
	Staunton	1,632
	Huntington	11,306
	Ashland, Ky	5,904
	Lexington, Ky	14
	Local	96
	Total	31,996
Quinnimont furnace to	Richmond and James River	2,143
	Waynesboro	14
	Huntington	5,997
	Ashland, Ky	1,093
	Winchester, Ky	150
	Lexington, Ky	43
	Total	9,440
Huntington to	Ashland, Ky	789
	Winchester, Ky	1,426
	Local	7
	Total	2,222
Ceredo to	Huntington	12
Ashland, Ky. to	Huntington	160
	Clifton Forge	151
	Mt. Sterling, Ky	159
	Lexington, Ky	72
	Total	542
Mt. Savage, Ky. to	Huntington	2,001
	Ashland, Ky	273
	Lexington, Ky	699
	Total	2,973
Olympia, Ky. to	Ervington	24
	Mt. Sterling	12
	Total	36
Winchester, Ky, to	Huntington	1,048
	Lexington	42
	Total	1,090

Lexington, Ky, to	Waynesboro	14
	Huntington	2,113
	Winchester	1,033
	Local	64
	Total	3,224
Local sts. to	R., F. & P. Junction	75
	Huntington	49
	Ashland, Ky	34
	Mt. Savage, Ky	12
	Local	20
	Total	190

Aggregate movement.....87,294 tons.

The movement from Waynesboro was of pig iron received from line of Shenandoah Valley Ry., from furnaces on that and the Norfolk & Western railways.—The movement to Charlottesville was to the Virginia Midland Ry., that to Staunton for shipment by Baltimore & Ohio Ry., that to Huntington for shipment to points on the Ohio; and those to Winchester and Lexington, Ky., probably for shipment to Cincinnati.

The largest movement from one point was from Low Moor furnace, 31,996 tons; the second largest movement was from Longdale furnace, 24,137 tons; and the third largest movement, 17,093 tons, was from Victoria furnace.

Iron Ore Movement.

To Quinnimont from	Ferrol	10
	Millboro	390
	Clifton Forge	20,392
	Covington	1,512
	Backbone	3,790
	Kanawha Falls	352
	Local points	157
	Total	26,603
To Low Moor from	Millboro	177
	Copeland	127
	Clifton Forge	16
	Backbone	11,527
	Local points	29
	Total	11,876
To Ashland, Ky. from	Clifton Forge	9,388
	Low Moor	1,335
	Covington	35
	Backbone	503
	Kanawha Falls	209
	Leon, Ky	242
	Enterprise, Ky	67
	Olympia, Ky	22,068
	Lexington, Ky	918
	Local points	4,128
	Total	38,893
To Mt. Savage, Ky., from	Williams cr., Ky	929
	Leon, Ky	414
	Fultz switch, Ky	299
	Enterprise, Ky	124
	Olympia, Ky	51
	Local points	187
	Total	2,004
To E. Ky. Ry. junction from	Goshen, Va	40
	Leon, Ky	12
	Enterprise, Ky	28
	Olympia, Ky	1,859
	Local points	158
	Total	2,097

The tons of iron ore moved from different stations were as follows:

Ferrol	108
Goshen	173
Millboro	579
Copeland	127
Clifton Forge	33,162
Low Moor	1,335
Covington	2,267
Backbone	15,821
Kanawha Falls	561
Williams creek, Ky	929
Leon, Ky	878
Fultz switch, Ky	299
Enterprise, Ky	267
Olympia, Ky	25,201
Lexington, Ky	1,008
Local points	7,358
Total movement	90,069 tons.

Of the above movement 53,568 tons were from Virginia mines, 561 from West Virginia mines, and 35,940 from Kentucky mines.

Limestone Movement.

To Victoria furnace from	Bell Valley	20,076
To Low Moor from	Copeland	213
To Quinnimont from	Fort Spring	18,462
To Local points from	Fort Spring	709
	Tons moved in Va. and W. Va.	39,460
To Ashland from	Olive Hill	4,523
	Farmers	255
	Local points	49
To Winchester from	Farmers	3,262
	Local points	51
To Lexington from	Farmers	4,274
	Local points	34
To Local points from	Olive Hill	124
	Farmers	1,047
	Local points	539
	Tons moved in Ky.	14,158
Total movement of limestone		53,618 tons.

Slate Movement.

Richmond to	Lexington	20
	Ashland	35
	Winchester	53
Clifton Forge to	Lexington	68
	Winchester	212
	Local points	26
	Total movement	414 tons.

The slate moved from Clifton Forge came from the line of the Richmond & Alleghany RR.

Marble Movement.

Craigsville to	Newport News	20
	Richmond	52
	Charlottesville	397
	Staunton	12
Goshen to	Charlottesville	13
	Staunton	177
	Total movement	671 tons.

Salt Movement.

This was all to local points from the following stations:

Newport News	2,005	Charleston, W. Va.	1,146
Richmond	913	Huntington, W. Va.	126
Staunton	57	Ashland, Ky	37
Malden, W. Va.	1,310	Local points	92
		Total movement	5,685

Notes on the Geology and Mineral Resources of the Floyd, Va., Plateau.

By Prof. Wm. M. Fontaine.

(Continued from page 192 of Vol. IV.)

Big Snake Creek.

The strata along the whole distance throughout the Blue Ridge, and on the Patrick pike, until within 8 or 10 miles of Hillsville, are almost wholly varieties of mica schist, hornblende schist, or rocks intermediate to these. On Big Snake creek, however, a belt of the glistening, contorted, bluish gray, hydromica schists, so abundant in Floyd, makes its appearance for the first time. This belt is over a mile wide. It shows the usual large proportion of quartz, and the indications of diffused sulphurets, so commonly seen in Floyd. The transition is sharp here from well crystalized, flagy hornblende schists that lie on the side of the creek, to the hydromica schists that occur on the other side, showing little or no distinct crystaline particles. The dip of the hornblendic rocks, as they are but little contorted, may be taken with accuracy, and the same may be said of the strike. But this was not the case with the hydromica schists. They were here, as usual, so much warped and contorted that I could not find dips and strikes that I could be sure were accurate. There seems to be an unconformity between these systems, for the dip of the hornblendic schists and mica schists is 55° to the S. S. E., and the strike 60° E of N., while the dip of the hydromica schists was made out to be 50° to the S. E., and the strike 30° E. of N.

In this belt of hydromica schist on the creek, and on the land of Mr. A. F. McGrady, good specimens of float magnetic iron ore may be picked up, but no deposit was seen in place. Large particles and masses of a limonite that seems to be highly manganiferous, may also be found,and although no deposit was seen in place, the frequency of the occurence of the lumps of ore, indicates that one does exist there. The ore is dark brown to black. Some of it seems to be nearly pure manganese oxide.

On the northwest side of this hydromica schist belt a narrow band of mica schist occurs, but this passes soon into a hornblende schist like that found on the opposite side of Snake creek. This forms a wide belt extending for several miles with numerous and important alternations of mica schist Near the margin of this belt next to the hydromica schist, there is on the Patrick pike, a heavy boss or vein of quartz, and close to that occurs the remarkable copper impregnation, known on the plateau as the "native lead." This native lead may be traced, following the strike of the rocks, from the southwestern portion of Floyd to near the southwestern margin of Carroll. I was informed that a copper impregnation of precisely similar character, and standing in the same relations to the deposits of sulphurets as that which exists here, may be found in North Carolina in the vicinity of Peach Bottom mines. Essentially the same mode of occurence for the copper exists in the middle counties of Virginia, as in Greene and Madison, and no doubt this may be found much farther north. The great distance over which we may trace the existence of the peculiar conditions that must have prevailed during the deposition of this copper, taken in conjunction with the small amounts of the metal, present a curious feature difficult to explain, but this fact renders the mode of occurence worthy of a careful description. Usually in this plateau portion of the state, the rock surrounding the copper deposit is a hornblendic mica schist that, in the immediate vicinity of the copper, is richer in hornblende than usual. The band containing the particles of copper varies much in width. It ranges from nothing to a width of 6 or 8 feet. It is composed partly of felsite, and partly of a hard quartzose hornblendic mica schist. These materials constantly graduate into each other, and no line of separation can be found. I saw no igneous or eruptive rock in this band. It is plainly the result of metamorphic action, and it may be that mineral solutions had access to this particular band after the general metamorphism of the region. Some of the felsite has a considerable amount of epidote, and this causes the rock to have an olive green color.

The copper occurs in the metalic state in the form of small particles as a rule. These are dispersed through the felsitic portions of the rock and are sometimes associated with quartz. Sometimes, but very rarely, larger lumps may be found. These, however, occur loose on the surface of the ground, and no large lump, to my knowledge, has been found in the rock. I have heard of one lump, weighing five pounds, that was picked up near Hillsville, on this mineral band.

In Greene and Madison counties, farther north, metalic copper occurs in much the same way in felsite bands that are often epidotic, but in these counties the predominant associated rocks are argillite schist and chlorite schist Here, too, the metalic copper does not seem to be so closely confined to the felsite. I have seen it diffused in fine particles through a considerable portion of beds of argillite.

On the farm of Spencer Gourd, 6 miles from Hillsville, and about one mile northwest of the "native lead" just described, a deposit of brownish colored manganiferous iron ore is found that may possibly prove to be of value. It occurs in a light gray mica schist, in the form of an irregular and interrupted ledge. This seems to be produced by an impregnation with ore of a definite band of the mica schist. In its widest part it is about 2 feet thick, but it does seem to be continuous.

The "native lead" passes about 1½ miles southeast of the village of Hillsville, having the same character as that it shows near Snake creek. Here, it is said, a lump of metalic copper weighing 5 lbs was picked up.

Extending from the "native lead" to the village we found the belt of mica schist used at Hillsville in building the court house. An examination of one of the quarries from which this rock was obtained, showed that at that spot the schist is rather massive, firm, and durable. The mica particles are larger and more distinct than usual, and this has caused some to call it granite. It may be worked, and when dressed looks like a gray sandstone. It makes a handsome building stone. This rock,with perhaps other species,seems to be continued S.W., forming Point Lookout and Buck mountains. The strike is 60° E. of N., and the dip 40° to the S. S. E.

This mica schist belt has many bands of hornblendic mica schist, and graduates on its northwest side into a belt of the so-called soapstone. This latter has bands of hornblende schist sometimes of rather coarse grain. To the northwest of this come mica schist and slate of fine grain, passing into hydromica schist and slate. These rocks extend for several miles up to, and include the great northern lode of sulphurets. In these last rocks a great deal of quartz occurs in veins, pockets and lumps. Some of the rocks have the knoty wrinkled look, the steel, or bluish gray color, and the high lustre so characteristic of the hydromica schists of Floyd county, but these features are less common here, and there is a greater tendency to assume the form of fine grained mica schist.

The Great Northern Sulphuret Lead.

This is the most important deposit of Sulphurets in the plateau. It may be traced continuously for twenty miles. It does not always form one undivided ledge, but

sometimes, locally, subdivides into branches that are a short distance apart. It also sends out, or is connected with, branches that diverge from it, and pursue courses of varying length nearly parallel to it. I have already, in *The Virginias* for October, 1882, given some account of this ledge of sulphurets and the other deposits found in Carroll. We may take the character of this lode at the Cranberry mine, where the Wytheville road crosses it, as a type of the lead in general. The Cranberry mine has been quite extensively worked by a tunnel driven along the junction of the oxidized upper portion or "gossan," and the undercomposed sulphurets or "mundic." This tunnel had been recently cleaned out, and I was enabled to get a good view of the deposit through which it is cut. I think that the deposit at this mine is a fair average for the entire lode.

The Cranberry mine was opened and worked in the period of the copper excitement that extended from 1854 to 1860. The workings were made wholly in search of black copper. This, as is usual, was found at the junction of the "gossan" with the "mundic" or sulphurets. The plane of junction certainly rises and falls, and this is said to occur in strict conformity with the exterior surface or with the topography, being lowest under the valleys. Perhaps 20 feet may be taken as the average width of the band of sulphurets. But this width is by no means composed of solid, pure sulphurets. The sulphurets are often mixed with more or less quartz, hornblende, or with the mica schist rock. This latter, adjoining and in the deposit, frequently assumes the form of hydromica schist and mica slate. The ores form impregnations and replacements of the country rock. They, on the whole, dip and strike with the country rock, but locally may vary somewhat in those points.

A mass of limonite more or less porous forms the top of the ledge, since it is formed by the oxidized outcrop of the sulphurets. This has of course the same width as the ledge of sulphurets, while the depth varies from 30 to 70 feet. A good deal of this material is a fair ore of iron. As it occurs always in the upper part of the sulphuret bands of Carroll, an enormous amount of it may be obtained. At many points, especially towards the south-west end of the sulphuret lode now being described, the ore seems to be excelent. The chemical composition of the better class of this ore will be given later. It contains sometimes a little carbonate of copper, but not enough to injure it, I think.

Pyrrhotite, or magnetic pyrites, usually composes most of the mass of sulphurets. In this, small particles and lumps of the yellow sulphuret of copper occasionally occur. Occasionally a little zinc blende and galena may be found, but these on the main lead are much rarer than the copper ore. Some of the spary carbonates, especially pearl spar, occur sometimes, but rarely. This is the case at the Wild-cat mine just south-west of the Cranberry. Here these carbonates seem to be intimately associated with the galena, which occurs at this mine but not at the Cranberry. Quartz, also, in distinct masses, is much more abundant at the Wild-cat than at the Cranberry. The general strike of this northern lead seems to be from 50° to 60° E. of N.

With the possible exception of such places as show associations of minerals such as are found at the Wild-cat, the general character of the minerals and their mode of occurence, do not encourage the expectation of finding ores of the precious metals in the main or northern lode.

Yellow Sulphuret Lead or Lode.

Begining some miles northeast of Hillsville, and extending some 6 or 7 miles to the southwest of that village, a rather singular mode of occurence for copper may be traced. This is called locally "the yellow sulphuret lead," from the occurence in it of chalco-pyrite, or the yellow sulphuret. The copper ore disappears about 7 miles southwest of Hillsville, but is said to reappear in precisely the same way at the Peach Bottom mines in North Carolina, where it holds the same relative position to the "native," or so-called "Trap lead," that it does in Carroll. Its occurence is as follows:

About a half mile to the northwest of the "native lead," and in the mica schist belt that runs by Hillsville, there is a band, not over 6 feet wide at most, that contains occasionally small lumps and particles of the yellow sulphuret of copper, and is more often stained with malachite. There is by no means a continuous occurence of these copper minerals. They are found here and there within this zone. I have nowhere seen in it any indications that the copper occurs in paying quantities. It is curious that so slight an impregnation should be traced over such a great distance. This zone runs nearly parallel with the "native lead" to about 6 miles southeast of Hillsville. There it seems to approach this latter, and with it soon disappears.

Near Woodlawn, 6 miles southwest of Hillsville, a belt of coarsely crystalized, heavily beded hornblendic rock occurs. This is unlike any rock seen elsewhere in the plateau. It appears from its associations elsewhere in Virginia, to be a lower member of the Huronian formation. It is probably a metamorphic diorite, and the crystaline particles are unusually large and distinct.

The mica schists and fine grained mica slates and hornblendic mica schists, that overlie this rock in the vicinity of Woodlawn, contain a great deal of very ferruginous quartz. This is at the same time cellular, and often charged with pyrite. Some of these veins are of great size and to judge from their general appearance, are very promising for gold.

At one locality, near Woodlawn, there is a great ledge of very cellular quartz full of limonite. Some pits had been dug on this and a tunnel driven into it during the copper excitement, in search of copper. As I was informed that gold had been paned out of the earth taken from this deposit, I was induced to have some quartz from it examined at the laboratory of the University of Virginia. The specimens taken showed a small amount of gold, viz: 60 cents worth per ton of quartz. The quartz, however, is from twenty to thirty feet wide, and presents many different kinds of material. I do not consider that the examination made is conclusive that gold is not present in paying quantities. In such a huge vein it is very possible that even rich quartz might exist, and not be discovered by testing a few hand specimens. I think that this region is well worthy of careful and detailed exploration. It seems to me that the finding of gold and silver, even in small amounts, from the little investigation that has been made, renders it quite possible that in the great number of quartz veins and pyritous deposits of this section, paying deposits may remain as yet undiscovered. I would call attention specially to the numerous outcrops of cellular and pyritiferous quartz, and to those Sulphuret lodes like the Dalton that are accompanied by heavy outcrops of quartz in the form of veins.

The southwestern end of the "Great Northern Lead" is marked by a great development of the sulphurets, and by the immense amount of gossan that they show on their outcrop. In this section a large amount of black copper was obtained prior to 1860. The sulphuret deposits occur here in the same kind of rock as that enclosing them at the Cranberry mine, viz: fine grained mica schist, graduating into hydromica schist. The rocks are precisely like those that in Louisa county contain the sulphuret deposits and auriferous veins that occur there. I will not attempt to even name all of the workings made towards the southwestern end of the lode. One or two of them will serve as types of the rest.

Clifton Mine.

This is situated near the southwestern extremity of the main or great northern lead. It consists of three seams of quartz varying from 7 to 10 inches in thickness, and some times swelling up to over one foot in thickness.

The quartz does not occur in the form of a fissure vein, but forms lenticular masses following the same zone, and enclosed in the hydromica schist. This rock becomes quite micaceous in some parts, passing into mica slate. It is some times quite chloritic. The quartz is associated with, and contains pyrrhotite, yellow sulphuret of copper, and a little galena and zinc blende. These sulphurets are also found to a smaller extent in the wall rock. The amount of copper is not large, but it indicates that paying quantities may be found. The amount of the sulphurets here is much smaller than usual on this lead. As it has been reported that a very large amount of silver was found in the galena of this deposit, I had it examined for silver and for gold, but none was found. Select specimens of mixed quartz and yellow copper show ten per cent of metalic copper.

The Dalton Lead.

About one mile northeast of the Clifton mine a zone of sulphurets appears to be sent off from the main to the northern lead. After diverging until an interval of about a mile lies between the two leads, it then runs parallel with the main lode to the vicinity of Hillsville. The point of departure or divergence is near Copperas hill. This band or zone of sulphurets is called the "Dalton lead." It shows at intervals heavy masses of gossan, but they are not so continuous as those on the main lead. The Dalton lead shows more of the characteristics of a quartz vein than the main lead. The mineral bearing zone is mainly quartz. and it looks much like a fissure vein, or at least there is probably a crush in the strata, and not a mere impregnation, as in the case of the main lead. The probability that it is a fissure vein renders it more favorable for the discovery of the precious metals. Where I examined it this lead carries much more galena than the main lead, and the amount of zinc blende seems to be sufficient to be worth working. The point where I examined this lead was near Chestnut creek. The top of a portion of it had been cut by a very shallow pit, and the extent of the exploration was by no means sufficient to disclose the amount and nature of the minerals present in it.

On the southeast side of and immediately adjoining the portions showing the most concentrated sulphurets, there is a huge outcrop of quartz, either a vein or "boss." It is over 30 feet wide. It has the appearance of a vein of quartz. The shallow pit had been filled up, and I could see only such ore as had lain a long time out in the weather. Portions of the ore might be selected that would show several per cent of lead, and a good deal of it has a large amount of zinc blende. The principal sulphurets are pyrrhotite and pyrite. Some yellow copper is found. Some of the mixed pyrite and blende was examined at the University of Virginia for silver and gold; 1.16 oz of silver were found. This was no doubt not the best ore that might be obtained from this locality. I think that the Dalton lead deserves especial attention, and have no doubt that it will yield valuable deposits.

At the locality examined, a pile of old cinder or slag existed, that had remained there since the remotest period in the recollection of the oldest inhabitant, and nothing was known of its origin. This would indicate that at some remote period attempts had been made to smelt the ores found here.

Mr. B. W. Dobyns, a gentleman of great intelligence and well acquainted with the history of this section, informed me that during the progress of the works at Copperas hill in search of black copper, the workmen found some old pits in which stone hammers were discovered.

Attempts were made very early to utilize the immense amounts of "gossan" found in the Chestnut creek district. I owe to Mr. Dobyns an account of them. Col. Chiswell, one of the first to attempt to develop the minerals of the state, had noticed the large amounts of iron ore in this portion of Carroll, and brought them to the attention of Blair who was engaged in the manufacture of iron. Blair, immediately after the Revolutionary war, moved out to this country, then practically a wilderness. He of course carried with him workmen of all kinds, and all the appliances needed for the mining and smelting of the ore. Quite a colony was formed. He erected a dam on Chestnut creek, put up a furnace, built many houses, and cleared the land around. Some of the buildings were quite pretentious, especially for that period. When, however, the ore came to be tried, it is said, the difficulty reported to exist in all the other gossan deposits of the plateau, was encountered. It was said that the iron would not weld. Blair then resorted to the ores of Wythe county as a source of supply. The remains of his dam and furnace are still to be seen on Chestnut creek, The contrast shown by the fields that he brought under cultivation, with the virgin country, still to be found all around, is very interesting. These fields bare of stumps even, and worn out, remind one of districts in the eastern part of the state.

Gossan of the Southern portion of the Great Northern Lead.

In the vicinity of Chestnut creek and for a long distance to the northeast, the amount of gossan is immense. The mass is sometimes 200 feet wide and 70 feet deep. A good deal of it seems to be an excelent iron ore. To test the quality, I selected a specimen of the best grade of ore found near the point where the Dalton lead diverges from the main lead, and where the gossan is unlimited in amount, being 100 feet wide and more. It was analyzed at the University of Virginia, and the result shows a surprisingly large amount of metalic iron. The analysis gives:

Metalic iron	57.82
Sulphur	0.174
P_2O_5	1.17

This ore does not contain copper enough to injure it.—The only injurious constituent is the phosphorus. I think then that the failure to weld is not due to any copper content. If we may assume that this is a fair representative of the best gossans, then there is in this section an unlimited supply of ore that may be utilized by the application of dephosphorizing processes. The inferior gossans are, to judge them by their physical properties, inferior only in being leaner ores, and more mixed with earthy matter.

Potters' Clay of Samuel Dobyns.

A deposit of potters' clay is found in the Chestnut creek region, on the farm of Samuel Dobyns. It is situated near the Carroll and Grayson mudpike. This clay is used a good deal locally in the manufacture of the coarser kinds of earthenware. Several small potteries use it. It is 3 feet thick, and seems to be a quite pure and plastic clay, that makes a strong ware which takes a good glaze. There are two kinds based upon the behavior on burning. One kind burns nearly white, and the other dark or gray.

Steatite Deposit.

While at Mr. Dobyns' house my attention was called to the material used for the facing of a fireplace. It is a steatite of excelent quality, of uniform composition, and compact texture. No foreign, hard particles are contained in it, and it may be planed and sawed with ease. It is not the so-

called steatite which is really a mica schist, but is apparently a true steatite. Unlike the ordinary soapstone of the plateau, it may be placed with any face to the fire, and does not split or scale off. I did not visit the deposit, but was informed by Mr. Dobyns that it forms a ledge, traceable for two miles and more, with a thickness of 8 feet. It passes about 2½ miles southwest of the Grayson Sulphur Springs, and is found on the lands of Messrs. Pickett, Sharp and others. It may be obtained in large blocks. In my opinion it will prove valuable as a substitute for fire brick, furnace lining, and other purposes where a high heat has to be endured. From the behavior of it in the fireplace, it seems to stand heat admirably. As this deposit lies between two of the reg ons of the state that are richest in iron ores, viz : the Cripple creek and adjacent sections, and the great gossan deposits of the plateau, it must in future prove very useful.

It was reported to me that gold had been, at various times washed out at several localities in this portion of Carroll and the adjoining parts of Grayson. I did not have an opportunity to verify these reports.

Jefferson Peak Copper Mine.

Since my visit to the Floyd plateau, and quite recently, a discovery of copper has been made at Jefferson peak in the Blue Ridge. I have received specimens from it, sent by Dr. Stigleman, that fully illustrate the mode of occurence and the nature of the ore. I have also received from the same gentleman an account of the size and location of the deposit, which I will give below. The ores will be examined in the laboratory of the University, and the results given in *The Virginias* when they are obtained This seems to be an important discovery, and we may hope that the locality will be brought within the reach of railroad transportation, if the railroad is ever extended from Patrick C. H., 14 miles distant, into the plateau. Dr. Stigleman's account of the deposit is as follows : "It is situated about 18 miles S. W. of the Fisher mine, on the east side of the Blue Ridge. There is a vein of quartz, colored green by malachite, that is about 20 feet wide. The quartz contains lumps of yellow copper of various sizes. One as large as a man's head was found. A good deal of mixed malachite and chlorite occurs in the seam of quartz. This seems to go entirely through the Peak. The northern wall is composed of chloritic schist, and is impregnated with malachite. The specimens sent to me show a very considerable amount of ore in the wall rock. The quartz vein shows crystalized quartz and calcspar.—This I think indicates that the deposit is a true vein and not an impregnation as is the case with so many of the copper leads of the plateau. This seems to be a very promising deposit.

On my return from Hillsville to Jacksonville, over the Carroll pike, I visited several places that were reported to contain valuable minerals. The following localities may be mentioned :

J. J. McGrady's Copper Deposit.

Some yellow copper is shown on the land of J. J. McGrady, about 7 miles east of Hillsville, and 5 miles south of the Carroll pike, on Burk fork, a bold stream that rises near Buffalo knob. The copper evidently occurs in the prolongation in this direction of the so-called "yellow sulphuret lead." It occurs in micaceous hornblende schist at this point. A band of this schist, averaging about 18 inches in width, is composed of mingled felsite and hornblende schist, with here and there particles of the yellow sulphuret of copper. Malachite stains occur abundantly. This is the most promising point that I saw on the yellow sulphuret lead. There has been little or no development, and perhaps the appearances do not fairly represent what might be found. At least no workable amount of copper is indicated by what may be seen.

Native Lead at Sutphin's Place.

The native lead appears at the Sutphin place, near McGrady's farm. It shows here the most promising feature that I saw on this lead, and may be taken as a fair type of the best portions of it. It has been worked here to some extent for the metalic copper. The highest percentage reported was 8 per cent, but none of the rock that I saw would give near that. It must have been obtained from carefully selected specimens The workings were a shaft of small depth, and one or two open pits a few feet deep.

The copper occurs in the metalic state The country rock is hornblende schist and hornblendic mica schist. The copper is found in a band a few feet wide, composed of mingled hornblende schist and felsite. The felsite has a good deal of epidote. The metal occurs sparingly and irregularly, always scattered through the felsite. It is found in particles varying in size from the dimensions of a garden pea down to the smallest visible specks. There is a coating of the red oxide always around the particles, and many of them are wholly changed to the red oxide. Some copper was obtained here by pounding the richer parts of the rock, but the amount does not seem to have been sufficient to encourage further outlay in development. This is another instance among the many that might be mentioned of the close association in Virginia of copper with metamorphic felsite.

Greasy Creek.

Reports of the existence of metalic minerals induced me to make an examination of some localities on Greasy creek. In each case the examination showed that the supposed valuable deposits were some sulphurets of iron existing in small amounts, or some kind of rock that has no value.

I regret to have to say that most of the minerals and rocks that I collected in the plateau and sent to the railroad (the Norfolk & Western), never came to hand, and hence I was not able to have the amount of chemical examination of these ores made that I desired. It is possible that a more favorable exhibit could have been made, and, at any rate, I could have spoken more positively in some cases than I can now.

Agricultural Character of the Plateau.

Although I might at this point properly end my notes on the plateau district, still I cannot forbear saying something of the resources other than mineral of this region. I do this because this section has long been, and still is, cut off from railroad transportation and other modes of cheaply communicating with the markets of the country, and I know of no portion of the state that is more capable of development if aided by the presence of railroads. The Danville and New River railroad is completed to Henry C. H., and is I believe under contract as far as Patrick C. H., 11 miles distant from the edge of the plateau. If this railroad should be carried into the plateau, it must promote very much the development of the iron, copper, and other mineral resources. If it should be carried to a junction with the Norfolk and Western, it would greatly develop the agriculture of the plateau, provided the people availed themselves of it to bring in the lime that might be obtained on the northwest side of Pilot mountain and its continuation southwest, and the gypsum that could be received from the vicinity of Saltville. I mention these two instances specially, because the soils of the plateau are such as to be benefited in the highest degree by the application of lime and plaster. Hardly anything else is needed but careful cultivation, to keep them in a state of fertility.

The Blue Ridge from Toncray to the Meadows of Dan and beyond, is mainly in forest, although most of the soil might easily be cultivated or put in grass. This mountain range in that direction, rises higher and becomes broader

than it is farther northeast. It is composed, as said before, of several broad-toped ridges that are often gently sloping, and show little bare rock. The soil is usually deep and mellow. Most of the land not suited for cultivation is admirably adapted for sheep grazing The diffused hornblende gives the soil enough lime to cause grass to grow well. Blue grass is a spontaneous growth.

The gentleness of the undulations of the surface of the mountains in this quarter, is well shown at the "Meadows of Dan." These are the comparatively level lands that lie on the Dan, before it begins to pass down over the mountain escarpment that overlooks the Piedmont region in Patrick.

Owing to the lack of public modes of transportation, this is one of the most isolated, thinly settled, and least cultivated portions of the state. Danville, nearly 100 miles distant, is the chief market, or at least has been, and transportation is by wagon.

In Floyd the surface is mostly hilly, and the meadows along the streams are small in area. The soil is usually light and friable. It is quick to respond to good cultivation and the aid of manures. Much of the soil if not carefully treated, would be soon exhausted. But if put in grass soon after clearing, it may be maintained for a long time without exhaustion. Until recently, a large portion of Floyd remained in the original woods, and even now there is a large proportion of woodland. There is a great deal of light, quick soil in this county that is well adapted to the growth of the fine, high-priced, light colored tobacco, such as is raised in portions of Pittsylvania county, Va., and in North Carolina. The cultivation of this tobacco has caused, since the late war, a considerable amount of land to be cleared. On most of the Floyd lands grass does well, but it would be greatly aided by the application of gypsum and lime.

The Brush Creek region is just on the edge of Floyd and partly in it. The lands here represent the better class of the Floyd soils. This region is the first naturally fertile gold district that I ever saw. At the time of my visit fine crops of clover and grass were growing on the same kind of soil as that yielding the gold veins.

In Carroll county the streams have a smaller fall, and there is a large amount of bottom land on them. This led the farmers long ago to pay attention to the making of hay and to the raising of cattle. The lands of Carroll are thus better preserved than those of Floyd, while at the same time they are naturally more fertile, having a larger proportion of hornblende in the rocks. This county is noted for its fine grass and for the number of cattle that it sends out. Considering the original fertility of the lands they are more productive in grass and other crops than any known to me in the state.

I cannot speak positively of Grayson county. I have only seen that portion of it about White Top mountain. The soil there is excelent for the growth of grass, and fine sheep pastures might be found.

The climate of the plateau counties is a fine one. Their situation so far to the south in the state, and at the same time their altitude of about 2,500 feet, combine to make them admirably fited for grazing purposes. The rain is abundant and well distributed over the year. The hot dry seasons found in the Piedmont and other counties of the state, do not occur here.

Fruits and vegetables do finely in this section, especially those that may be shiped to distant markets, and serve as a source of revenue.

Cranberries grow wild in abundance in the wet and marshy lands. Some of them are gathered for home use. There is little doubt that their cultivation would be successful, and prove to be a source of considerable revenue.

The apple does better here than in any place known to me. No one could fail to notice the vigorous growth of the trees, and the great age to which they retain their capacity for producing full crops. The fruit reaches an exceptional size, and is not surpassed in flavor.

In the Blue Ridge especially, large areas might be found where the vine could be cultivated with great success. It is begining to be known that nowhere in the United States can any section better suited for grape raising be found, than along the Blue Ridge in Virginia. The hornblende schist and similar rocks of the Blue Ridge portion of the plateau, give a deep mellow soil, with enough lime for the purposes of the grape, while the slopes of the land cause them to be well drained.

Among vegetables the Irish potato, onion and cabbage succeed finely in the plateau. The light soils, cool climate, and abundant moisture, suit the Irish potato exactly. As is usual in high lands, the potato has here a delicacy of flavor, a dry, mealy nature, and a capacity for keeping that it does not have when raised in less elevated parts of the state.

Onions can be raised in any quantity and give no trouble in their growth.

The cabbages of this section attain great size, and are a sure crop. They seem to be free from the enemies that destroy them in the eastern part of the state.

The Water-power of the Plateau.

Few if any portions of the state are so well watered by runing streams of considerable size. A glance at the map would show this. As all the streams of any consequence rise in the Blue Ridge and, with the exception of Dan river, make their way across the plateau, a considerable portion of their course must lie within it. Many of these are bold streams and maintain a good body of water in all seasons. They have a considerable fall, and wonld give fine water power, affording numerous sites for manufactories. The following considerable streams may be mentioned as having this character: Little river and a number of its tributary creeks; Big Reed Island creek and many of its tributaries, such as Big Snake creek, Burk fork, and Greasy creek, Little Reed Island creek, Poplar Camp, Crooked, and Chestnut creeks. Lastly, New river flows through the southwestern end of Carroll, and through Grayson county, receiving numerous important creeks.

It must be remembered that the resources of all kinds of these counties are wholly undeveloped. The nearest railroad is the Norfolk and Western, distant from the central line of the counties from 17 to 20 miles, over mountain roads. No portion of the state is capable of as much development, could cheap public transportation be obtained.

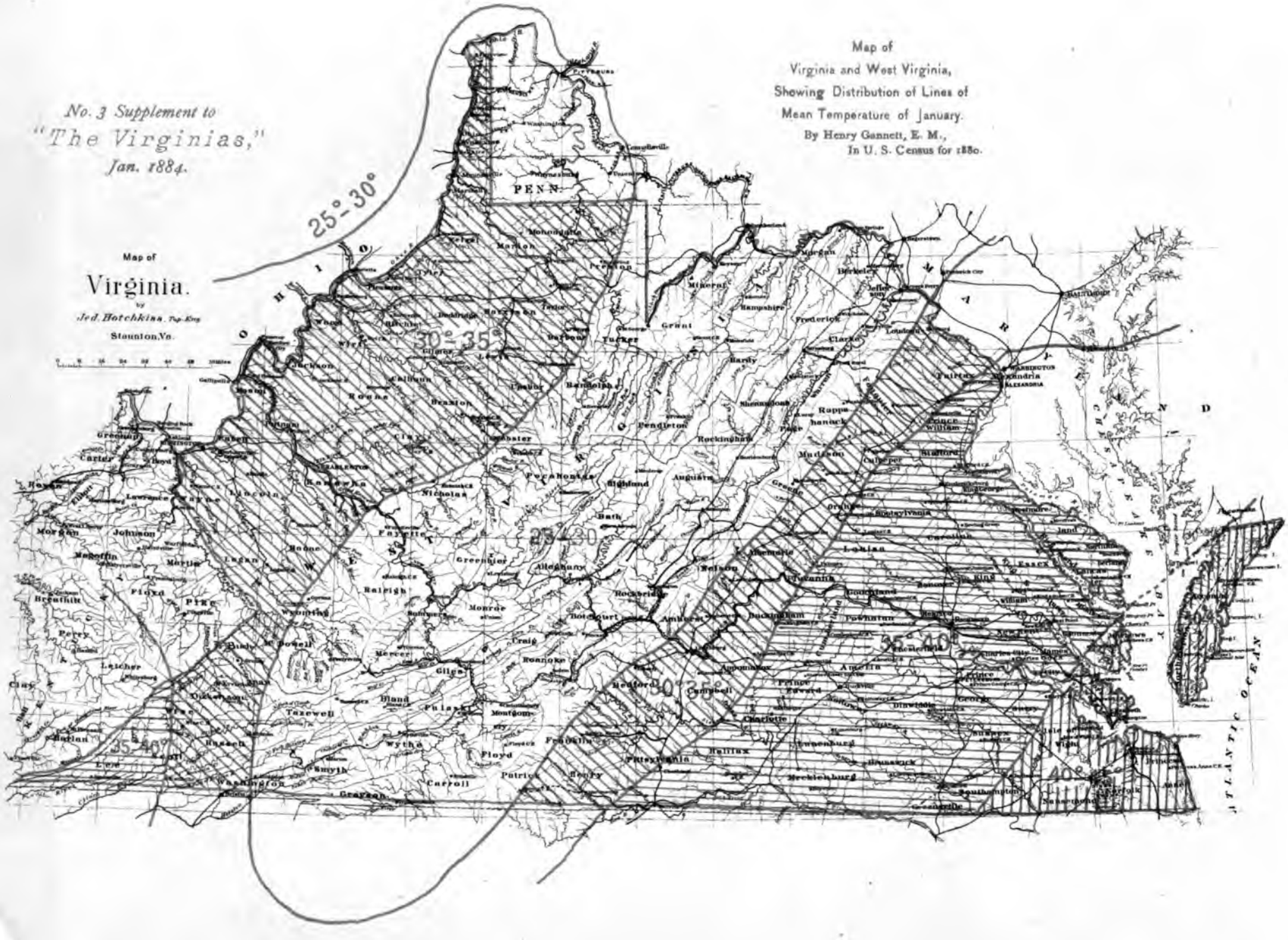
Potomac basin Coal in 1883.—The shipments of coal from the 17 mines of the Potomac coal basin—generally called the Cumberland coal region—during the year 1883 were as follows:

Shiped by Baltimore & Ohio RR	1,382,008 tons.
Shiped by Ches. & Ohio Canal	681,225 tons.
Shiped by Penn. RR. line	418,966 tons.
Total shipments in 1883	2,482,200 tons.

Of the above quantity 260,995 tons were shiped from the *Elk-garden* mine and 68,942 from the *Big Vein* mine on the West Virginia Central & Pittsburg Ry. A total of 329,937 tons. or over one-seventh of the product of the whole basin for the year,—a most excelent showing in energy of management and furnishing capacity for mines that made their first shipments of coal October 20th, 1881.—We learn that the W. Va. Central & Pittsburg Ry. Co., which has offices at 57 Second St., Baltimore, Md., and 21 Exchange Place, Boston, Mass., is now shiping from its wharves at Baltimore over 1,000 tons daily of this fine Cumberland steam coal.

No. 3 Supplement to
"The Virginias,"
Jan. 1884.

Map of
Virginia and West Virginia,
Showing Distribution of Lines of
Mean Temperature of January.
By Henry Gannett, E. M.,
In U. S. Census for 1880.



Second, that of 30° to 35°, which includes adjoining portions of Piedmont and Midland in the east and portions of The Valley and Apalachia in the west. We would enlarge the area of this zone as a whole and place detached zones of it in the 25°–30° region.

Third, that of 35° to 40°, which embraces most of Midland, most of the Western marine plain of Tidewater, and a portion of Apalachia. In the north it extends too far to the west, and in the south too far to the east. Its eastern border in Apalachia is wrongly placed.

Fourth, that of 40° to 45°, which embraces the Eastern marine plain, the region of low-lying north-and-south peninsulas. It shows fairly well the actual conditions, but arms of it should extend in places to the westward, and we think a portion of its territory in the southeast belongs to the warmer zone of 45° to 50°.

West Virginia is shown as having but two zones of January mean temperatures, 25° to 30° and 30° to 35°. Cooler zones belong within the former, and warmer ones within the latter.

In a subsequent number we will give other temperature maps and repeat those here given, corrected in their details, together with further notes on the temperatures of these states.

Flat-top Coal and Coke.—On page 196 of *The Virginias* for 1883, is a return of the output of coal and coke at the Pocahontas mines of the Southwest Va. Improvement Co,, on the Norfolk & Western Ry., Tazewell county, Va., to Dec. 1, 1883. Below is the output, in 2,000 lbs. tons, for Dec. 1883, kindly furnished *The Virginias* by Supt W. A. Lathrop.

Coal shiped in Dec., 1883	11,426 tons.
Coal coked in Dec, 1883	9,007 tons.
Total coal mined, Dec., 1883	20,433 tons.

Output during 1883.—The S. W. Va. I. Co. began the shipment of coal and coke May 1, 1883. The following figures represent its coal and coke business from May 1 to Dec. 31, 1883,—its operations during the year 1883.

Coal shiped during 1883	76,614 tons.
Coal coked during 1883	42,439 tons.
Total output of coal in 1883	119,053 tons.
Coke shiped during 1883	25,282 tons.

From the statement of quantity of coal coked and coke shiped, it appears that this company used, on an average, 1.67 tons of coal for a ton of coke; a very good result considering that it represents the first nine months of the begining of mining and coking operations in an entirely new coal region. This year will show a very large increase in output and, no doubt, better results in coking. This company has not been able to supply half the demand for the high grade Flat-top coal that it mines, so it enters upon the new year with good prospects for a large and remunerative business.

Old Virginia Nail and Iron Co.—A letter of 28th from Col. A. H. Leftwich, informs us that he has just started his rolling mill, 3½ miles above Lynchburg, on Richmond & Alleghany Ry., on light T rails for Col. Dillon's railway to his lime kilns at Indian Rock, near R. & A. Ry., Botetourt county, Va. The merchant train and nail machines will start about the middle of February.—It is gratifying to know that this iron-working establishment is again in operation in good hands. There is no reason why it should not be a great success.

Forest Products Traffic of Chesapeake & Ohio Ry., 1880–1883.—We are indebted to Mr. William L. Rawson, the efficient lumber agent of the Chesapeake & Ohio Ry., for the following interesting comparative table of the forest products traffic (lumber, cooper stuff and bark) of that railway during the years 1880, 1881, 1882 and 1883, in carloads of 10 tons each, 2000 pounds tons.

Destination.	Products.	1880.	1881.	1882.	1883.
Newport News,	Lumber	....	....	1,288	2,004
	Cooperage	....	....	.....	114
	Bark	....	....	.....	5
Richmond & James R.,	Lumber	3,447	4,314	4,863	2,319
	C operage	....	....	.....	372
	Bark	....	....	.....	29
R. F. & P. Junction,	Lumber	....	....	.....	46
	Cooperage	....	....	.....	6
Charlottesville and Gordonsville and Va. Mid. Ry.,	Lumber	218	320	925	2,089
	Cooperage	...	....	.....	340
	Bark	....	....	....	48
Waynesboro and Shen, V. Ry.,	Lumber	....	....	.....	114
	Bark	....	....	....	7
Staunton, & B. & O. Ry.,	Lumber	262	346	301	242
	Cooperage	....	....	.....	9
Huntington & Ohio River	Lumber	436	1,015	1,554	1,135
Ashland & Sci. V. Ry.,	Lumber	....	....	....	611
	Cooperage	....	....	....	205
Winchester & Ky. C. Ry.,	Lumber	....	....	....	2,410
	Cooperage	....	....	...	61
Lexington & Ky. C. Ry.,	Lumber	....	....	....	612
	Bark	....	....	....	337
Local points and stations,	Lumber	1,635	2,331	2,794	1,860
	Cooperage	....	....	....	34
	Bark	....	....	....	87
Totals		5,993	8,359	11,675	15,169

The traffic of 1880, 1881, and 1882, included cooperage and bark with lumber; and in same years all business of the E. L. & B. S. division (the C. & O. from Huntington westward) was embraced in deliveries to Huntington and local points.

The estimated amount of lumber, converted into board measure, moved during each of these years was as follows:

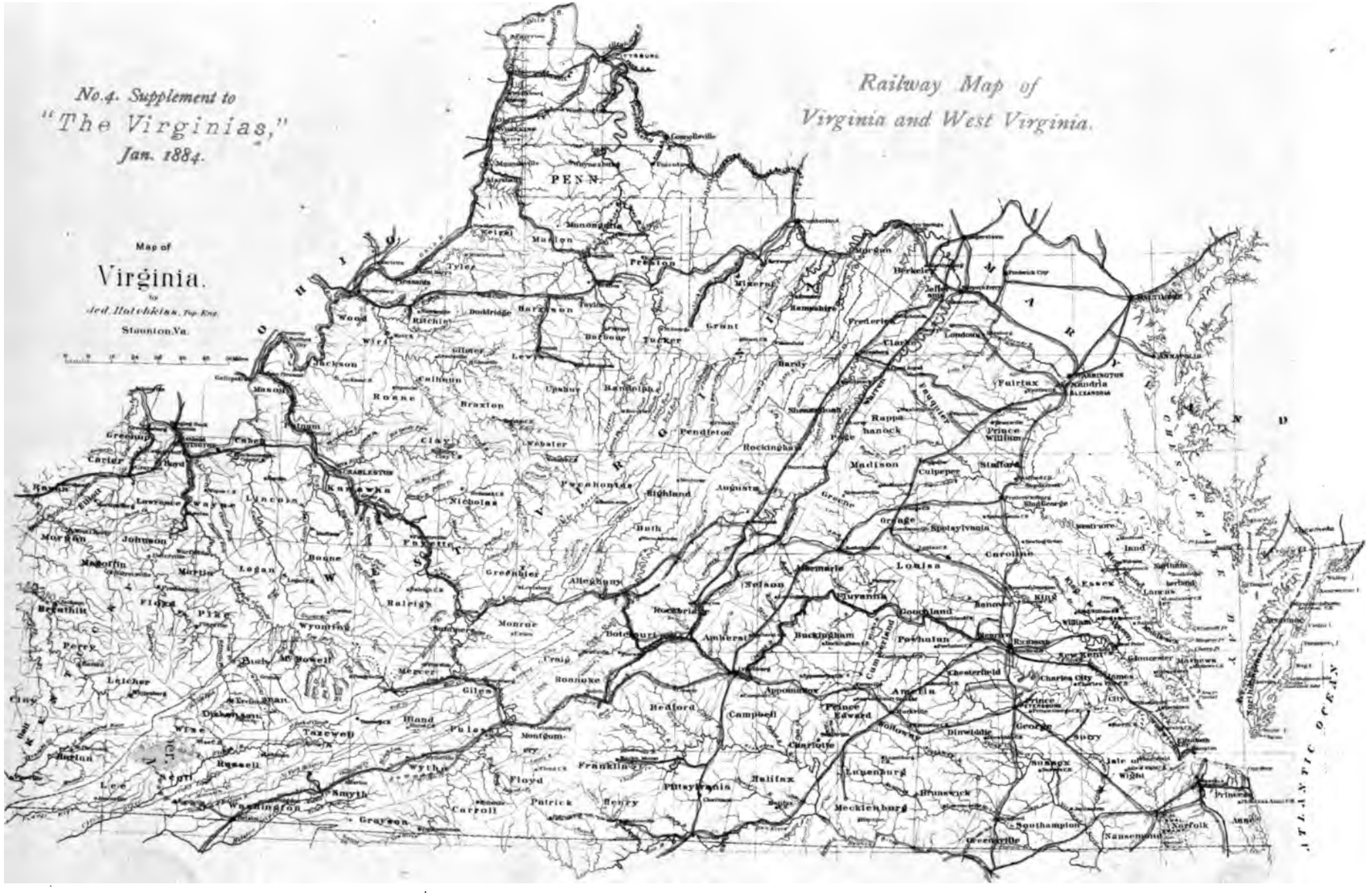
In 1880	41,951,000 ft.	In 1882	82,725,000 ft.
" 1881	58,513,000 "	" 1883	101,100,000 "

The movement of 1883 consisted of 13,475 car loads of lumber, 1,181 of cooperage, and 513 of bark.—Total car loads 15,169.

The stations that received the largest quantities of lumber were: Goshen 48 car loads, Longdale 89, Low Moor 171, Fire Creek 25, Hawks Nest, 33, Cannelton, 120, and Charleston, 88. All this was used in houses and other constructions at the places named, evidencing the large amount of improving that has been done along this great railway.

The large quantity to Winchester, Ky., was much of it material used in constructing the extension of the Kentucky Central Ry.

The Railway map of the Virginias on page 15 of this number had to be used in an incomplete and unsatisfactory form for want of time; it will appear in our next in a finished condition and accompanied by an article on the railways now in operation and those projected in Virginia and West Virginia. This map suggests numerous extensions of existing lines and routes for new ones that could be advantageously made through regions abounding in resources and between terminal points that have many advantages as trade distributing centres.—It suggests also that a *free railway law* would be a powerful factor in promoting the early construction of these desirable railways.


No.4. Supplement to
"The Virginias,"
Jan. 1884.
Railway Map of
Virginia and West Virginia.
Map of
Virginia.
Staunton, Va.
PENN.
ATLANTIC OCEAN

Roanoke Land and Improvement Co.—The prospering inland city that in the last three years, under the name of Roanoke, has grown up at the junction of the Shenandoah Valley and the Norfolk & Western railways around the station of the latter road that was previously known as Big Lick, in Roanoke county, Virginia—in Roanoke river basin part of the Great Valley of Virginia—is mainly the outgrowth of the operations of the Roanoke Land & Improvement Company, as we are forcibly reminded by the annual report of that company for the year 1883, an early copy of which has been kindly furnished *The Virginias*. From this report we gather the following interesting items concerning the upbuilding of this new and thriving center of industry in one of the fairest and every way most inviting portions of Virginia.

The officers of this company for the current year are: J. B. Austin, president; Charles Hacker, Clarence H. Clark, John Bullitt, Edward W. Clark, F. J. Kimball, P. L. Terry and Joseph H. Sands, directors; and W. C. DeArmond, secretary. Messrs. Austin, Sands and Terry are residents of Roanoke, the other gentlemen named are residents of Philadelphia, Pa.

The report of President Austin, dated Dec. 5, 1883, summarizes the growth of Roanoke in statements of the number of its buildings of all kinds:

In Nov., 1881, it contained 198 buildings, of which 58 were dwellings, 5 churches, 3 hotels, 3 boarding houses, 5 tobacco factories, 3 general stores, 3 blacksmith shops, 1 newspaper and printing office, 1 bank, and one each of the other shops, stores, etc., generally found in thriving villages.—In Nov., 1882, the buildings had increased to 428 (a gain of over 259 per cent), of which 268 were dwellings, 6 churches, 9 hotels, 12 boarding houses, 7 blacksmith shops, 4 railway station buildings, 2 newspaper and printing offices, besides 2 hardware stores, 1 spoke factory, 2 stationer stores, 2 real estate agents, 1 large blast furnace (the Crozer), and 9 shops of the Roanoke machine works, that were not in existence in 1881, besides an increase in all other stores, shops, etc.—In Nov., 1883, the buildings had increased to 747, (a gain of over 74 per cent on the numbers of 1882, and of over 527 per cent on those of 1881), of which 9 were churches, 10 hotels, 20 boarding houses, 5 restaurants, 4 meat markets, 5 tobacco factories, 3 banks, 3 newspaper and printing offices, 2 warehouses; of stores, 12 general, 3 hardware, 3 furniture, 7 clothing, 3 stove and tinware, 3 millinery, 4 jeweler and watchmaker, 9 dry goods, 3 tobacco, 2 agricultural implements, 23 grocery, 4 drug, 4 stationery, and 1 carriage; of shops, 7 shoemaker, 7 blacksmith, 3 harness maker, 2 foundry and machine, 2 planing mill, 3 wheelwright, 1 spoke making, 1 cigar making, 1 iron making blast-furnace, 22 shops of Roanoke machine-works, 6 bakeries, ete., etc.—The Improvement company during the year erected 2 frame and 52 brick buildings and a fine brick block containing 7 stores and 44 offices; and individuals erected, upon lots bought from the company, 2 offices 16 stores and 76 dwellings.

The report proceeds to enumerate the work done by the company during 1883 in the opening and grading of roads, avenues and streets, the paving of sidewalks, the planting of shade trees, the laying of water mains and the erection of hydrants, the construction of terra-cotta sewers, the filling up of low grounds, the showing the exercise of a liberal and enlightened policy in improving the condition of its extensive properties while the authorities of the town, doubtless stimulated by the example of the company, engaged extensively in general impovements of the same character.

With warranted satisfaction this report chronicles of 1883: that the town has been healthy; that the Roanoke Gas Co., organized April 4, lighted the town with superior coal gas Nov. 9; that the Roanoke Live-stock Association was organized May 3 and held an exhibition of live stock, Oct. 16-19, of a most complete and satisfactory character, one that thousands of visitors from Virginia and neighboring states attended; to the 4 days Roanoke meeting of the Amer. Institute of Mining Engineers, the first of June, which the citizens and railways made agreeably memorable; and to the satisfactory progress and prosperity of the various industries there established.—And it might have added—what we, from continued observation of the passing events of the growth of this town and industries, will say for it—that a large amount of credit should be given to the Norfolk & Western and Shenandoah Valley railway companies for the aid, both suggestive and substantial, they have given in bringing about these results, proving them not only the benefactors of this radiating center of their great railway system, but also of the two great states, Virginia and West Virginia, which their lines traverse and in the on-coming development of which they are to play such an important part.

Mr. Joseph H. Sands, the general superintendent of the Norfolk & Western and Shenandoah Valley railways and the Roanoke Machine works, furnished this enumeration of the number of men brought to Roanoke by these companies: By the Roanoke Machine works 690, married 319, single 371; by Shen. Valley Ry., motive power 37, married 17, single 20; by Roanoke railway yard 113, married 52, single 61; by railway offices, N. & W. and S. V., 112, married 42, single 70; a total of 952 men of whom 430 are married and 522 single. The Crozer Iron Co. employs 125 men.—Mention is also made of the operations of the Rorer Iron Co. which commenced operations during 1883, building five miles of railway to the iron ore mines south of Roanoke and shiping 8,000 tons of ore, from July to Dec., to furnaces in Ohio, Pennsylvania and Virginia.

That town building is a good business is evidenced by the statement that during 1883 this Improvement company sold in building lots 27.1 acres at the rate of $2,190.80 per acre, and that it sold 16 houses that it had erected for $21,700, all "at a satisfactory advance on cost and upon terms easy to the purchaser," and that regular 6 per cent dividends have been paid on its capital stock, the dividends for the year amounting to $18,807. The future income of the company, from existing rents, interest, etc., is estimated at $42,500 a year, and it has 934.4 acres of land unsold. The total cost of the Roanoke Hotel property is stated as $59,514, and of the waterworks $89,623. The Roanoke Improvement Co. has spent over $550,000 for land, buildings, etc.

Norfolk & Western RR.—The December, 1883, gross earnings of this railway were $232,752, a gain of $7,994, or 4 per cent. on the earnings of Dec. 1882. The net earnings of December 1883 were $85,987, which were $15,195, or 15 per cent, less than those of December, 1882. This winter has been remarkably severe in Virginia and so the runing expenses of the railways have been unusually large, the proportion of expenses to gross earnings having been 63 per cent in Dec., 1883 against 55 per cent in Dec. 1882.

During the year 1883 its gross earnings were $2,812,777; an increase of $383,036, or 16 per cent gain, over those of 1882. The net earnings of 1883 were $1,303 203; an increase of $196,040, or 18 per cent gain, over those of 1882.—A showing very creditable to the management of this great railway.

The New River division was opened to the coal fields May 21st. The earnings and expenses of the New River division are included in the above monthly statement.

The Virginias.

Serial No. 50. Vol. V.—No. 2.

Staunton, Va., February, 1884.

Jed. Hotchkiss, Editor.

"The Meadow Branch Anthracite Coal, Iron and Lumber Co. has been incorporated in Baltimore, with a million dollars capital. The property of the company consists of a tract of land of about 6,000 acres, situated in Berkeley and Morgan counties, W. Va., between the ranges of Third Hill and Sleepy Creek mountains, near the main stem of the Baltimore & Ohio Railroad, at Cherry Run station. A shaft has been opened, and the anthracite coal found, upon examination, compares favorably with the very best hard coal of Pennsylvania. It gives out a heat that is intense, and burns entirely free of clinkers and with but few ashes; this is what those who have used it say. This fuel supply is a matter that we are all vitally interested in, and with a railroad to Martinsburg our hard coal supplies could be laid down for certainly fifty per cent less than at present. We would not be over 30 miles from these coal fields, and by an all-rail connection would have the mines practically at our doors. From all we can see the company will start with the most flattering prospects of entire success, though the stock has not yet been put upon the market. Our people must stir themselves and take hold, and talk of building this Martinsburg connection. As we said in a former article that the consumption of hard coal in this city is about 2,500 tons annually; $7.80 per ton is the prevailing price this winter. The saving to the consumers of hard coal alone, puting the reduced sort at 50 per cent, would be $9,750, or the interest on over $150,000 at 6 per cent."

We find the above in the Winchester, Va., "Times," under the heading "The road to Martinsburg needed." We are prepared to say that the railway mentioned is needed, not to carry anthracite coal from the mines of Meadow branch but to complete the direct line of railway through The Valley, for we have no idea that Winchester will ever get a supply of anthracite from the mines in question.

We publish this extract for the purpose of warning investors to be cautious about puting their money into this scheme if they expect to realize a profit from the anthracite coal that it will furnish. The coals of Sleepy Creek and Third Hill mountains are undoubtedly anthracites; but they are anthracites not of the Carboniferous or regular coal measures, but of the Sub-Carboniferous, Vespertine, or No. X, rocks, that are everywhere irregular and unreliable and that have never been profitably worked.—We have published the reports that Prof. Wm. B. Rogers made on these coals when state geologist of Virginia; his conclusions were based on careful examinations and can be relied on as accurate and conclusive. He reported that this field had no commercial value.

Gold mining in Va.—A gentleman from Floyd county who takes great interest in the development of that section, reports great enhancement in value of property in that section. All that is needed is a railroad leading through the county. Gold in large quantity is reported, and a mining company is being formed to develop it. Nine acres of bottom land, bought at $1,100, has paned out $30,000 in gold. The point mentioned is fourteen miles from Christiansburg. Northern men are taking options on lands at $100 per acre, and paying a bonus in addition for the privilege of prospecting. The gold fever is geting stronger every day and it is likely that improved machinery will be erected soon for the extraction of the metal from quartz. The entire southwest is fast becoming of great importance in mineral products.—*Lynchburg Advance.*

Coal and Coke Traffic of Ches. & Ohio Ry., Jan., 1884.

General Manager C. W. Smith, sends *The Virginias* the data for the following statement of the total output and distribution of coal and coke received from mines on line of C. & O. Ry., (including fuel on Lexington division) during January, 1884, and January 1883, in tons of 2,000 lbs., compiled by fuel agent, C. M. Gibson:

Kind.	1884.	1883.	Increase.	Decrease.
Cannel	113	1,672	....	1,559
Gas	26,582	24,616	1,966	....
Splint and block	6,518	13,655	....	7,137
New River, &c	40,625	31,237	9,388	.....
Coke	5,702	9,448	....	3,746
Totals	79,540	80,628	11,354	12,442

The distribution of the above was as follows:

	1884.	1883.
1. To Ches. & Ohio Co. for its own use	18,592	16,264
2. To Huntington, for West via Ohio river	.....	176
3. On Elizabethtown, Lexington & Big Sandy RR	3,078	4,209
4. On Ches. & Ohio Ry., excepting Richmond.	14,188	15,527
5. To Richmond & Alleghany RR. at Clifton Forge.	866	1,392
6. To Valley RR. of Baltimore & Ohio at Staunton.	.....	63
7. To Shenandoah Valley RR. at Waynesboro	17	139
8. To Va. Midland Ry. at Charlottesville	6,899	5,096
9. To Richmond, Fredericksb'g & Potomac RR. Junc.	371	419
10. To Richmond for consumption including tugs, &c	10,893	13,107
11. To James River wharves for shipment	.....	2,494
12 To Newport News { Consump'n includ'g tugs &c,	915	830
12 To Newport News { For shipment	23,701	16,912
Totals	79,540	80,628

The American Institute of Mining Engineers had, as usual, a successful meeting at Cincinnati, Ohio, commencing the 18th instant. The officers elected for the year 1884–5, are: James C. Bayles, of New York, president; Eckley B. Coxe, of Drifton, Pa., Thomas Egleston of New York, and Edwin C. Pechin of Cleveland, Ohio, vice-presidents; Edward S. Cook of Pottstown, Pa., Frank Firmstone of Easton, Pa., and G. W. Maynard of New York, managers; T. D. Rand of Philadelphia, Pa., treasurer, and Rossiter W. Raymond of New York, secretary. The officers chosen are all good ones, but it is rather singular that they are all taken from three states when the Institute has so many members in all parts of the United States, the Dominion of Canada and elsewhere.—Dr. Raymond will make a most worthy successor to Dr. Drown who has been so reluctantly parted with as secretary The continuing success of the Institute depends largely upon the secretary, and this is assured by the election of Dr. Raymond to this important office.

"I certainly do not propose to do without *The Virginias.* I congratulate you upon your valuable paper."—*Capt. Ed. N. Kirk, Talcott,* Principal of Morgan Park Mil. Academy, Ill.

"I read your monthly issue with profound interest and look upon it as the star of the South shining forth development and progress."—*W. J. Denman, Ellenville, N. Y.*

No. 5
Supplement to
"The Virginias,"
Feb 1884.

New Flat-top coal companies.–We see in the "Princeton Journal," of Mercer county, W. Va., that the stockholders of the Crane Creek Coal Co., the Widemouth Coal Co., the Rich Creek Coal Co. and the Indian Ridge Coal Co. are called to meet at the office of E. W. Clark & Co., 35 South 3rd St., Philadelphia, Pa., March 17th, 1884, to consider resolutions for the increase of the capital stock of these companies and for other purposes.

The above named companies, chartered under the general laws of W. Va., and the Flat-top Coal Co., chartered at the present session of the legislature of Virginia by amending a charter previously granted to the London & Buckingham Co., are outgrowths of the recent purchase of some 45,000 acres of coal and timber land in Mercer, Wyoming and McDowell counties, W. Va., and a few acres in Tazewell county, Va., mainly on Flat-top mountain and its eastward spurs and slopes, but embracing some large tracts on the westward spurs of that mountain.

These lands begin at those of the Southwest Virginia Improvement Co., near Pocahontas station of New River branch of Norfolk & Western RR., and extend 16 miles to the northeast.—The five companies above named are localized as follows:

1. Flat-top Coal Co. will own the first 10,000 acres of land adjoining and lying northeast of the lands of the S. W. Va; Improvement Co., and drained by Mill, Simmons and Bell creeks of Bluestone river. The immediate extension of the N. & W. RR. down the Bluestone from the mouth of Laurel creek, a point on the railway now in operation, will give easy access to the "Big" or "No. 3" bed of the Flat-top coal series, where that bed has its full thickness of 10 feet of first-class semi-bituminous Flat-top or New River coal. On these lands this company, of which Mr. C. H. Duhring, of Philadelphia, Pa. is president and Mr. J. H. Bramwell, of Roanoke, Va., superintendent, proposes to at once make leases for mining coal on a large scale. It has rented, for present use, an office at Pocahontas, which will be in charge of Capt. I. A. Welch, who has been retained in the service of the company.

2. Crane Creek Coal Co. will own some 10,000 acres lying next on the northeast to the lands of the Flat-top Coal Co., chiefly drained by Crane creek and its branches. On these lands the "Big" bed parts into Nos. 3 and 4, two very fine beds, from 15′ to 20′ apart, and 4′ 9″ and 6′ 6″ thick respectively. The coal of one of these beds is unusually hard for New River coal, coming out, so far as tested, in fine blocks. It is probable that the branch railway will soon be extended some 5 miles up Crane creek to the outcrop of this harder coal, one that will better bear longer transportation to meet the distant demand that is sure to come for these superior domestic, steam and coking coals.—Here also are the higher beds, Nos. 6, 7 and 10, that are, respectively 6′, 5′ 6″, and 5′ 2″ thick.

Widemouth Coal Co. owns some 10,000 acres of land lying northeast of and adjoining the lands of Crane Creek Coal Co. Its lands are mainly drained by Widemouth creek, one of the large tributaries of Bluestone from Flat-top mountain. The same coal beds are here as on Crane creek, but they have not been as fully tested.

4. Rich Creek Coal Co owns the land, some 10,000 acres, next northeast from Widemouth Coal Co's land, and drained in the main by Rich or Richland creek of the Bluestone. This is the most northeasterly located of these companies. The coal beds of the Flat-top series are known to be here in good condition, but they have not been tested as yet.

5. The Indian Ridge Coal Co. owns some 5,000 acres of superior coal land on Indian ridge, a spur of Flat-top mountain that projects to the northwest as the dividing ridge between the Big Sandy and Guyandot rivers. On it is the line between Wyoming and McDowell counties. The Flat-top coals are in good condition on these lands, but they are detached and remote from the railway and it is not probable that they will be developed or utilized very soon.

Among the prominent parties interested in these companies are George M. Bartholomew and Samuel Coit of Hartford, Conn.; Vivian Gray & Co. and T. W. Powell of London, England; and E. W. Clark & Co., and Drexel & Co. of Philadelphia, Pa.; and Echols, Bell & Catlett of Staunton, Virginia.

The operations of these companies, in addition to those of the S. W. Va. Improvement Co., will soon make a very great difference in the deliveries of Flat-top coal by the Norfolk & Western RR. so that it will before long become an important factor in the coal business of the country, especially since this great railway is making such extensive preparations at Lambert Point, northwest of Norfolk and nearer Hampton Roads, by the constructing of piers, pockets, tipples etc., for making that a great coaling station.

Cincinnati Iron Market Report.—Under date of Feb. 18, 1884, E. L. Harper & Co., send to *The Virginias* the following report of the Cincinnati iron market:

The flood, which culminated here on the 14th inst., at 71 feet 1 inch, has proven more disastrous to the great Ohio valley than we could have anticipated. The waters have reached far into the interior and nearly all the mills in the West, Pennsylvania, Pittsburg, West Virginia, Mahoning valley, and Ohio River sections have been inundated. The presence of this deluge, unprecedented in its record, has necessarily interrupted general business and almost suspended traffic in iron in the large territory flooded. The consequently large curtailment in the production of manufactured iron will give an impetus to the trade when resumption becomes practicable. Many of the furnaces in the area of the flood, taken by surprise by the extraordinary rise of the waters, are affected with chilled stacks, so that in not an inconsiderable measure production of pig iron has been abridged. It is but reasonable to suppose that materials and prices will appreciate in value. The general demand for pig iron in the East, the North and the West continues fairly active. Prices rule firm and we quote the market, as follows, on 4 months:

Foundry.

Virginia & West Va. strong coke, No. 1, at	$19.00	and $20.00.
" " " No. 2. at	18.50	19.00.
American Scotch	19.50	and 20.00.

Gray Forge.

Virginia & W Va. neutral coke	$17.25	and $17.75.
Virginia & W. Va. cold short	16.75	and 17.25.

Car-wheel.

Southern car-wheel, strictly cold blast	$27.75

New iron ore mines are being opened in Virginia now that spring weather has come. The Lexington "Gazette" reports that Sherwood & Echols are reopening the old "Echols" mines on Richmond & Alleghany RR. near the mouth of North river of the James. These are Potsdam ores. A washer is to be erected at the Miller dam of the old North river canal.—Ore is now being taken from the "Griffin" mines, on the Rorer Iron Co. RR., a few miles south of Roanoke, for shipment to Dunbar furnace, Pa., to test its quality, etc.; says the Roanake "Leader."

The Virginia Congressional Districts.

On the 22d instant the legislature of Virginia passed an apportionment bill districting the state for the 10 members of Congress it is entitled to by the results of the census of 1880. As this apportionment is a matter of general public interest we hasten to lay it before our readers accompanied by a map on which these districts are colored, by counties, and numbered. In like manner, for general information, we reproduce from the "Richmond Dispatch" the votes cast by the two political parties in the state in 1881, in the gubernatorial election and in 1883, in the election of members for the General Assembly of Virginia:

No. 1.—The First District.

	1881.		1883.	
Counties.	Daniel.	Cameron.	Democrat.	Coalition.
Accomac.....	2,064	1,447	2,586	1,156
Northampton .	760	930	862	915
Lancaster.....	447	646	661	700
Richmond.....	430	698	665	715
Northumberland	657	644	789	582
Westmoreland	503	762	769	854
Gloucester	927	777	1,164	1,244
Middlesex.....	436	568	583	783
Mathews..... .	737	323	853	477
Essex.....	717	794	869	1,102
King & Queen	877	789	1,011	946
Caroline.....	1,263	1,249	1,486	1,663
Spotsylvania. .	1,104	1,027	826	887
Totals.....	10,922	10,554	13,124	12,024
Democrat maj.	368		1,100	

No. II—The Second District.

	1881.		1883.	
Counties.	Daniel.	Cameron.	Democrat.	Coalition.
Princess Anne.	595	842	988	962
Norfolk.....	2,474	4,105	4,234	5,115
Nansemond...	598	1,591	1,297	1,825
Isle of Wight..	880	857	1,190	1,189
Southampton..	1,034	1,563	1,930	19
Elizabeth City.	329	1,020	449	775
Warwick..... .	85	221	417	585
York.....	292	492	607	639
James City.....	112	375	468	780
Charles City....	359	467	405	611
Surry.....	581	361	660	849
Totals.....	7,339	11,894	12,645	13,349
Coalition maj.		4,555		704

Norfolk county embraces Norfolk and Portsmouth cities.

No. III.—The Third District.

	1881.		1883.	
Counties.	Daniel.	Cameron.	Democrat.	Coalition.
Henrico	6,269	4,886	9,866	7,440
Goochland....	637	868	787	767
Chesterfield...	1,723	1,614	2,921	2,140
New Kent.....	228	553	499	648
Hanover.....	1,376	878	2,138	1,641
King William..	726	714	901	982
Totals.....	10,959	9,513	17,112	13,618
Dem. maj.....	1,446		3,904	

Richmond city is included in Henrico county.

No. IV.—The Fourth District.

	1881.		1883.	
Counties.	Daniel.	Cameron.	Democrat.	Coalition.
Prince George	430	845	384	719
Sussex	620	927	777	1,216
Dinwiddie.....	477	909	2,473	2,857
Greensville...	349	853	612	986
Brunswick.....	346	1,708	1,152	1,570
Mecklenburg..	687	2,248	1,582	1,934
Lunenburg. ...	467	968	818	1,048
Nottoway.....	152	1,348	390	1,029
Amelia	433	401	608	900
Powhatan.....	285	805	635	828
PrinceEdward	590	1,562	977	1,498
Totals.....	4,836	12,664	10,408	14,585
Coalition majority..... .		7,828		4,177

No. V.—The Fifth District.

	1881.		1883.	
Counties.	Daniel.	Cameron.	Democrat.	Coalition.
Pittsylvania . .	3,971	3,677	5,921	3,573
Franklin.....	1,588	1,555	2,816	1,655
Floyd.....	622	974	957	1,247
Henry	1,005	1,125	1,568	1,346
Patrick.....	617	952	1,154	708
Carroll.....	1,015	651	1,303	1,002
Grayson	626	1,361	1,156	1,118
Totals.....	9,444	10,295	14,875	10,649
Coalition majority.....		851	4,226	Dem. maj.

Danville City and North Danville are included in Pittsylvania county.

No. VI.—The Sixth District.

	1881.		1883.	
Counties.	Daniel.	Cameron.	Democrat.	Coalition.
Botetourt . .	1,165	797	1,635	791
Roanoke.....	698	1,254	1,538	1,398
Montgomery..	1,016	1,105	1,393	1,299
Bedford..... .	2,333	1,782	3,377	1,524
Campbell.....	3,383	1,756	4,017	2,886
Charlotte.....	694	1,037	1,538	1,072
Halifax..... .	2,226	2,197	3,280	2,985
Totals.....	11,515	9,930	16,778	11,955
Dem. maj.....	1,585		4,823	

Lynchburg city is included in Campbell county.

No. VII.—The Seventh District.

	1881.		1883.	
Counties.	Daniel.	Cameron.	Democrat.	Coalition.
Frederick . .	1,933	1,195	1,827	866
Clarke . . .	978	326	1,154	352
Warren . . .	909	262	939	269
Rappahannock	968	492	887	710
Madison .	637	1,088	945	919
Greene . . .	398	496	557	397
Albemarle . .	2,215	2,061	3,036	2,229
Rockingham	2,127	2,623	2,635	2,678
Shenandoah .	1,499	1,888	1,794	1,912
Page	526	783	841	1,169
Totals . .	14,190	11,214	14,615	11,501
Dem. maj.	2,976		3,114	

Winchester city is included in Frederick county

(Continued on page 29.)

Capital, real and personal, invested in Business in the Virginias.—In a supplement to Bradstreet's, the leading mercantile journal of the country, we find a tabulated statement of the real and personal capital invested in business in the United States, by states, compiled from the 1880 Census report on aggregate national wealth; from that we take these figures for Virginia, West Virginia and the United States:

	Va.	W. Va.	U. S.
Number of traders in businesss in 1880.....	10,715	3,348	703,328
Commercial houses and manufacturing firms.			
Capital invested.....	$32,798,600	17,310,600	3,224,533,498
Real estate owned, value...	$36,488,200	15,957,500	2,811,417,515
Total wealth, including capital invested, personal property and real estate..	$87,478,000	34,448,200	7,019,260,812
Incorporated manufacturers.			
Capital paid in.....	$6,659,100	5,269,800	974,666,335
Real estate value, including fixed machinery.....	$2,953,000	1,684,000	457,811,529
Total wealth, viz: actual capital, personal property and real estate	$6,865,600	4,263,300	1,158,245,050
Aggregate capital invested			
Capital in business	$39,457,700	22,580,400	4,199,199,833
Real estate owned.....	$39,451,200	17,641,500	3,269,229,044
Total wealth, including capital in business, personal property and real estate..	$94,343,600	38,711,500	8,177,505,862

A new map of Rockbridge county, Va., on a scale of one inch to one mile, has just been published by Mr. John Carmichael, of Lexington, Va., at $3,50 per mounted copy or $10 for three copies.

This map, for a copy of which we are indebted to Mr. C., is based on the map of the late Col. Wm. Gilham, made from road surveys by cadets of the Virginia Military Institute, and published in 1859,—a map that was merely an outline of the wonderfully varied county it delineated.—The claim that this new map is in part based on the surveys of Maj. Jed. Hotchkiss he is compeled to repudiate, as he sees nothing on the map that indicates that any use was made of the detailed topographical maps of the Guy run and other large iron properties in that county that he has published. The location of iron and tin ores is given in colors, on the authority, it is stated, of Prof John L. Campbell.

This map will meet a present want and is worth all that is asked for it, and anyone needing a map of Rockbridge county would do well to send at once and get one, as the edition is a small one; but we greatly regret that a better map, one that could make pretentions to accuracy, one that would properly locate the water courses and mountain ranges of that most picturesque of counties, could not have been published, especially at this time when the mineral wealth of Rockbridge is attracting so much attention and when so many have an urgent need for a good map for which they would pay a good price.—We hope Mr. Carmichael will speedily sell all the copies of this reproduced and patched map and then go to work and give us a really new map, one based on actual surveys, and one put right-side up on the sheet.

An outside view of the tariff question.—Hon. J. R. Tucker, of Virginia, is quoted as saying that there is a growing feeling in Virginia for a high tariff, and that it astonishes him. By "high tariff" Mr. Tucker means a protective tariff. Mr. Tucker might have remarked also that this growing feeling is not confined to Virginia, but exists in a majority of the southern states where any progress has been made in manufactures, or where any attention has been given to them. This is a fact which no one will now gainsay. To attribute this "growing feeling" to the teachings of protective newspapers, as some of the anti-protection journals do, is to greatly overrate the power of those papers and underrate the intelligence of the people. This growing feeling is not to be attributed to that altogether, while doubtless it has had its influence by disseminating facts and figures for general information. But the people of the South, now embarked in new enterprises and looking to a grander future, in a material sense, have seen the benefits other sections have derived from a protective tariff in the past, and believe that if it has been instrumental in developing and enriching those sections, it may also be instrumental in building up our industries, and in developing and enriching the South. As practical business-men, from a business standpoint, discarding theories that have long since been exploded, they propose to enjoy some of the benefits that others have enjoyed so long. and to whose enrichment the people of the South, when she had few manufactories of her own, contributed millions of dollars annually Here is the secret of this growing feeling, noted by Mr Tucker, and we don't see why he or any one else should find cause for "astonishment" in it. It is simply a proof of the fact that level-headed, practical, business sense is coming to the front, and that we, who have been shaking the trees for others, propose to have some of the fruit for ourselves.—*Charlotte (N. C.) Observer.*

February weather laws.--For the Middle Atlantic states during the month of February, winds blowing from the south to east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north to west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

For the station at Washington, D. C., and for the month of February, mean barometer corrected only for temperature and instrumental error, 30.086; mean barometer reduced to sea-level, 30.206; mean monthly range of barometer, 1.190; mean temperature, 36°.1; highest since commencement of observations, 78°.0, in 1874; lowest since commencement of observations,—1°.5, in 1875; mean monthly range of temperature, 54°.0; mean precipitation, 2.85 inches; prevailing wind, northwest.

The Kentucky Union Ry., says the Lynchburg News, is a line projected from Lexington, Ky., to Abingdon, Va. At Lexington it connects with the Louisville & Nashville for Louisville and with the Cincinnati Southern for Cincinnati. Of this line nearly 20 miles will be finished by the 1st of March, and before the close of this year it will be in operation as far, possibly, as Jackson, Breathitt county, Ky.

This line will penetrate what is probably the wealthiest mineral and coal region in America, and it will have a wonderful influence in opening to commerce a section of country as yet scarcely known. The bituminous coal on this line is equal to any in the world, experiments showing that only the best coal in England can be compared to it. The forests along the line of the road are also rich in valuable woods, paticularly black walnut, white oak and other varieties that are being much sought after for home use and foreign exportation. This road, when completed, will be another feeder to the Norfolk & Western Railroad.

The proposed new tariff bill of the current session of Congress is now before the country, and it is meeting, as it deserves to meet, very decided opposition in every direction. We are pleased to see that even those in Virginia that we have heretofore been accustomed to look upon as pronounced free-traders are taking right views of at least a portion of this "bill to cripple American industries," as it should properly be called. The following from the able editor of the Lynchburg, Va., Advance,—a decided free-trader, is worthy of commendation in what it says about wool; but he is still all wrong on the pig-iron and iron ore questions. We repeat, what we have stated before, that if the railways were so disposed they could put Cuban iron ores, of high grade, down in Lynchburg, at a profit, cheaper than they can be delivered there from James River mines.—The duty on iron ores should be increased rather than diminished, as they should also be on pig iron, as anyone familiar with the details of production in Virginia at this time very well knows.

"We have been giving Col. Morrison's tariff bill the most favorable consideration of which we are capable and are sorry to confess that we cannot give his work our approval, nor do we believe it can get the approval of the democracy of Virginia. The general reduction of duties to 20 per cent is all right and proper, but the free list does not exhibit a practical knowledge of the needs of the people, either in a just relief of burdens or a fair distribution of incidental benefits. To put ores, wool and lumber on the free list exhibits a lamentable want of consideration for states like Virginia, North Carolina, West Virginia and Tennessee, states crippled by war and poverty and struggling for the development of their mineral and agricultural resources. There are thousands of acres of now waste lands in these states most suitable for sheep and our poverty-crippled landholders have been striving to increase their flocks, and our people and press have urged the occupation of these lands with sheep. Is it right that after the manufacturers of woolens from Maine to Maryland have had eighteen years of prohibition in which to collect millions from landholders, these flock-masters in embryo, these landholders trying to raise flocks should be thrown into direct competition with the cheap wools of Australia, Mexico and Sonth America, and that this should be done to propitiate and advantage these same bloated New England woolen manufacturers and stop their complaint against a twenty-per-cent reduction on their manufactures? The agriculturist is still to pay the manufacturer, and what the consumer of woolens gains from the manufacturer the agricultural wool-grower is to pay. This is not right or fair, and is not good policy. So also when high protection on lumber in all its shapes has enriched Michigan, and when high protection on manufactures of wood has enriched Northern manufacturers, and all that the manufacturer paid to the lumber men of the Northwest, was mainly paid by the South for wagons, carriages, plows and other implements, and the stock of Northwestern lumber is about exhausted, and the immense, unused, unproductive forests of the South are about to be valuable, is it fair, is it just, to relieve the manufacturers and give them free lumber from Canada? Is another impediment to be thrown in the way of Southern profitable development? We might say the same of ores, and we should be willing to have free ores if the tariff on iron, especially pig iron, was reduced to a low revenue duty, so that even English capital would have to come to the mines of West Virginia, Virginia, Carolina, Georgia, Tennessee and Alabama. But we see no equivalent offered to our mine owners. But we have other objections to the free list. It does not meet the great requirement of a free list based on giving the people cheap necessaries. It is filled with a number of things that are in the nature of material for manufactures of various kinds, and the benefit goes to the manufacturers. In our opinion the country does not require, nor should it have, a large free list. Better to have a very low revenue rate on even necessaries—for a quarter of a cent on coffee, one cent on tea, and so on, would not be felt by consumers, while it would raise a revenue which would enable us to cut down the duty on other articles, certainly to get rid of internal taxation. What the democrats of the West and South have heretofore claimed, as we understand it, was a reformation of the revenue laws of the country, so as to equalize the burdens on consumers, and equalize the benefits incidentally given to manufacturers and producers. We do not think Col. Morrison's bill does this.

The shipments of logs, lumber, staves and bark from Newport News, Va., during 1883, brought to that port by Ches. & Ohio Ry., have been kindly furnished *The Virginias* by Mr. W. L. Rawson, general lumber agent of C. & O. Ry.

The receipts of above forest products during 1883 were 18,886 tons (2240 lbs.), of which 12,784 were exported to foreign countries and 744 sent coastwise to domestic ports, in 61. cargoes, as follows:

Destination.	Cargoes.
Cetti, France staves	1
Lisbon, Portugal, staves	1
Tarragona, Spain, staves	1
Liverpool, England, lumber, logs and staves	11
London, " " " " "	1
Glasgow, Scotland " " " "	4
Hamburg, Germany, " " " "	3
Cargoes exported	22
New York, pine wood (2,885 cords)	13
New York, lumber, logs, staves etc	12
Philadelphia, " " " "	2
Baltimore, " " " "	10
Boston, " " " "	1
Norfolk, " " " "	1
Cargoes to domestic ports	39

Locomotives with fog-horn signals, or whistles, are now used on the Chesapeake & Ohio Ry. exclusively for passenger trains, adding, in many ways, to their safety and giving increased efficiency to the service of this thoroughly well managed railway, one that forms part of a grand transcontinental system between the two great middle latitude harbors of North America, Newport News on the Atlantic and San Francisco on the Pacific.—We have recently riden over a number of the great railways of the eastern United States and nowhere have we found quite as good a track for continued comfort in traveling as on the C. & O. Railway.

Rorer Iron Co.—The iron ore mines of this company, near Roanoke, Va., are now in charge of Mr. J. Herbert Bramwell, one of the best mining engineers of the country, as superintendent. In ten working days of January, during the worst winter weather that has been experienced in this region for many years, he mined 600 tons of ore. He has recently made three new openings in the face of the iron hill from which 250 tons a day can be easily mined and removed at a cost of much less than a dollar a ton; he expects to soon be in a condition to mine and ship, without difficulty, over 3,000 tons a month.—If any one is in doubt as to the stratified condition and the quantity and quality of our No. 1, or Potsdam iron ores, we would advise him to visit these mines.

Bitumiuous Coal in Blast-furnaces.—In the Bulletin of the Am. Iron & Steel Association of Nov. 21, we find the following interesting item :—"For several weeks past Colebrook Furnace No. 2, at Lebanon, Pa., has been using bituminous coal as a fuel, in place of anthracite, and the experiment has given excelent results. The product of the furnace for last week, with all coke and bituminous coal, using Cornwall ore exclusively, was 602 tons. At present the charge of fuel is 1,950 pounds of coke to 150 pounds of bituminous coal. When anthracite was burned it was not found possible to use more than 1,500 pounds of coke in a charge of 2,100 pounds. The use of bituminous coal secures lighter pressure and generally better results. This we believe to be the first furnace east of the Alleghanies to use bituminous coal and coke exclusively.

Loging on Gauley river, W. Va.—In a recent number of the Northwestern Lumberman, of Chicago, as honestly and impartially conducted a trade journal as we know of, we find the following very interesting and valuable notice of loging operations on Gauley river, W.Va., a stream that has its head springs along some 60 miles of the front of the Great Carboniferous escarpment that forms the eastern border of the heavily forested Trans-Apalachian country northeast of New river and the Chesapeake & Ohio Ry., and that joins New river (the Upper Kanawha) just above Kanawha Falls station of the C. & O. The lumberman of this article, we are pleased to see, has a proper appreciation of the skill of our hardy mountaineers, and having that, and making use of it, he succeeded in his operations where others failed, and has proven, what we have always insisted upon, that the logs from any part of our mountain country can be readily and profitably brought to railways or navigable rivers to where they can be marketed.

"Whether the Gauley river, in West Virginia, can be successfully driven is a question that has troubled the operators on that stream about as much as the same question has the men interested in geting logs down the St. Louis river, in Minnesota. Mr. H. A. Frink has been operating on the Gauley, and what he says to a representative of the Charleston *Leader* will give lumbermen not acquainted with that stream a better idea of it than anything that we have before seen in print.

Mr. Frink said: "I had had considerable experience with wild and rough streams, and felt confident that the valuable and heretofore untouched timber areas of the Gauley could be reached by navigating that stream. Upon this feeling I made a contract for the delivery of 50,000 pipe staves at Gauley bridge. Against my hopes stood the fact that some pioneer lumbermen, shortly before, had attempted to drive logs through the rapids of Gauley, and had failed. Notwithstanding this unpromising feature, I sent my hands 27 miles up the river, midway of the rapids, last spring, where they got and put the staves to the river, at Woods' mill. Here they remained for want of water till November, when there came a freshet. In the meantime I had built and properly equiped with necessary tackle, two boats for the purpose. My crew was entirely of West Virginians, and I would here recommend them as preferable to others, unless you could get men who had been schooled to the business on the wild streams of Maine. The western lumberman is a success in has own field, where the streams are smooth and sluggish, and where a moderate splash dam will make miles of slack water, and take logs slowly and safely to market. But when they visit the Gauley, it presents a new condition of things; falls, rapids, reefs, white caps, foam and spray, tortured waters and large boulders in the channel, make them pronounce it impracticable for lumbering purposes, and they leave without even trying it. One of the correspondents of the Northwestern Lumberman visited this region during the last season. After examining the extensive forest, of wild cherry, poplar, oak, etc.,he goes into ecstacies in his report of the quantity and quality of the timber, but winds up with: 'Nothing but the angels of heaven will ever get this timber out, and they will have to take it skyward,as there is no other possible way of geting it away.' Now, notwithstanding all this, I do unhesitatingly say—and that after considerable experience in driving both staves and logs on this river and many streams elsewhere—that although the Gauley is one of the wildest and most rapid rivers in the state, and heretofore has been deemed impracticable for lumbering purposes; yet lumber can be driven out of it 1,000 for 1,000, and mile for mile, for less cost and in less time than out of any stream of the same size in the state of Michigan. The mistake of the few pioneers who have tried it has been the attempt to drive on too high water.

"When the rise is over six feet the current has such power that it is impossible to work the rapids with boats. Another result is that the logs are thrown far out in jams among the rocks, where the expense of delivering them back will exceed the original cost of taking them from the stump to the river. In driving our staves we passed numbers of abandoned logs, lying high and dry, where they will perhaps remain until they rot. This was the result of trying to drive on a flood. My men, where convenient, rolled some of these logs in for the pleasure of seeing them dart the rapids. If they had all been in the river we could have brought them right along on the stage on which we drove our staves. We commenced driving staves November 10, and delivered them at Gauley bridge on December 14. During this time there were two freshests—one of two feet and one of three feet above low water. I do not mean that we were employed the whole time between these dates, but during the continuance of these freshets. My force was from 8 to 15 men. The boats were worked over the rapids, and every reef cleared of lodged staves, and this without a boat being stoved or capsized. In driving 50,000, we lost, or rather left, 500 staves. There were 27 rapids in the drive, with a fall of from 5 to 30 feet each, and many shoals."

The correspondent says: "Mr. Frink pointed out to me logs lying in the boom at Kanawha Falls that were 40 inches in diameter, that came 100 miles down Gauley, and there was no serious bruise or material injury on them. He thinks that the ordinary stage from April 1 to the 1st of May, is about the best volume of water for the successful navigation of that river. It is likely that a rise of two or three feet in Gauley river would not be sufficient to bring logs out of Hominy creek, Cherry, Cranberry and Williams rivers, but logs could come from these tributaries on higher freshets. I do not suppose that a small capitalist could do much on Gauley, but for parties of large means there are millions. We used to speak of it as an 'inexhaustible' forest; and while it was mountain-locked and land bound, and no demand, the word was quite applicable; but when the wants of the world are made known, and a way found to get it to market, we will have to hunt a new word to apply to our timber, and in a few years to our accessible coal; but we can still keep the old terms for the rocks in New river and for the Gauley cliffs. The pioneer applied the term to the buffalo and elk; it has since been applied to the deer, bear, turkey and wild pigeon; but our stock of inexhastibles is like an auctioneer's sale, going, going, gone !, and in 20 years after the Ohio Central reaches the mouth of Gauley—unless the owners appreciate its value before it is gone, which is not likely—the inexhaustible forest will be exhausted, so far, at least as concerns its first-class timber; but its exhaustion will give work and comfort to many West Virginia families, and revenue to the state."

The Growth of Stalactites in Virginia Caves.—In the Virginia volume of Prof. Wm. B. Rogers' papers, now in course of publication by D. Appleton & Co., we find the following report of remarks made by him (Proc. Boston Soc. of Nat. Hist., vol. 5 p. 336) on the growth of stalactites; the conclusions of years of observation of the caves of Virginia.

A drop of water charged with Carbonate of Lime is seen to form at a particular point of the roof and after its descent, another drop, by the same mechanical causes, takes its place. It is not necessary to suppose a hole around which the concretion may collect. Usually there is none. At the margin of the drop where it thins away to a film, evaporation and the loss of carbonic acid combine to cause a precipitation of part of the dissolved carbonate, which on separating, attaches itself to the rock in the form of a very delicate white *ring*, corresponding to the margin of the liquid. Each succeeding drop deposits a similar ring in contact with and beneath that already formed, until the whole is prolonged downwards in the shape of a *quill-like tube*. This, from its vertical position, invites the water of the adjoining part of the roof to descend along its outer surface, and now an exterior and more rapid growth begins. Usually the former process continues to operate for a long time after the external growth has commenced; so that the stalactite, in some cases, retains its open central canal until it has reached a length of a foot or more, and a diameter at its base of two or three inches. As the water which flows along the outside of the tube, parts at each step with a portion of its calcareous charge, and thus grows continually less capable of forming the deposit, the rate of deposition must diminish somewhat regularly from the upper to the lower end of the mass. Hence it is that stalactites, formed in positions where their growth on all sides is freely permitted, have always a *sharply conical or tapering form.*

The drops which fall from these pendants to the floor, still retain a portion of carbonate of lime in solution, but as the shocks of the impact and the spreading of the liquid greatly favor the escape of its carbonic acid, a further deposit must be formed in this position and thus the stalagmite grows upwards to meet the stalactite growing downwards, until in many cases they unite to form a column reaching from the floor to the ceiling of the cave.

As in general the infiltering water follows the joints and planes of stratification of the limestone rock, the *fashion* or *pattern* of the *stalactite drapery will be more or less determined by the position aud arrangement of these divisional surfaces.* Where as in parts of Weyer's Cave, in Virginia, these planes of beding are steeply inclined, and meet the roof in a series of parallel lines, the concretionary action seems to have commenced by forming parallel rows of stalactites along these lines. This process, in certain places, has gone on until by lateral union of the adjoining pendants of each row, they have been transformed into *parallel sheets of stone*, which, in some instances, extend from the roof to the floor. From their great extent, and a degree of thinness which in part renders them translucent, these sheets are capable of being thrown into sonorous vibration by a blow from the heel near the ground, and under these circumstances they emit a musical sound of great depth and force.

Nitrates in Cave earths.—Among the papers published in the forthcoming volume of the Virginia papers of Prof. Wm. B. Rogers, we find the following interesting note from Proceedings of Boston Soc. of Nat. His., vol. 5, p. 334:—

Professor William B. Rogers remarked that from his observations in the caves of the Middle and Southern states, he was satisfied that the earthy deposit containing the nitrates, known in some places as petre-dirt, was chiefly derived from the overhanging and adjacent rocks, and not from the sediment brought into the cave by existing or former streams. The limestone, in which the nitriferous caverns are found, often contain a large amount of siliceous and argilaceous matter, and in some instances, a marked proportion of organic substances. The more previous layers, gradually deprived of their carbonate of lime by the leaching action of the water in filtering from above, are reduced to an earthy mass, the mere *caput mortuum*, as it were, of the original rock. In some cases this decomposition pervades the stratum for a great distance; the residuary, fine-grained, ashy clay retaining the lamination and beding which it had before the change. In course of time, the earthy mass falls to the floor by its own weight, aided, perhaps, by occasional tremors of the ground, or it is detached by the load of stalactites suspended from it below, and thus comes within the leveling and transporting action of the streams flowing through the cave.

As to the production of the nitrates with which the petre-dirt is more or less impregnated, Professor Rogers thought that it could not, in any large degree, be refered to the excretions and other remains of animals occasionally found in these caves; since the quantity of nitrogen required for this purpose would far exceed such a means of supply. Besides this, the nitrates are found in the earthy mass while it is still adhering to the roof or walls and far removed from the organic matter supposed to be buried in the floor. Nor can we regard the nitrogen as chiefly derived from the organic substances in the decomposing rocks. For, in the case of some caves producing petre-dirt, the surrounding limestone contains only a trace of such ingredients. We must, therefore, refer the formation of the nitric acid, and ultimately the nitrates, to mutual chemical reactions between the porous calcareous earth and the contiguous atmosphere.

The demand for Oak timber.—The Northwestern Lumberman of Chicago, the leading authority of this country on all lumber questions, writes well and knowingly, as follows, concerning the constant demand for oak timber. We rejoice at this growing demand, for no states in the Union have as much good oak, of several species, to dispose of as Virginia and West Virginia,—in fact oaks are the most abundant of their forest trees.

"Ten years ago it would hardly have been admited by dealers who handled Michigan and Indiana oak that in a decade there would be such a thining out of the "monarchs" of the forest that a scarcity would be felt. Oak was in too great abundance in some sections of those states to suit the fancy of the owners of the land upon which it grew. Much of it was cut simply to get it out of the way, and the owners of it thought they were fortunate if they could sell it to mill men who would cut it, and thus, themselves, be saved that trouble. There was less call for it then than now. As the building of railroads has increased, the demand for oak increased proportionately, until now the once great oak states —Michigan and Indiana— cannot justly lay claim to being called such. Oak in those states has not boomed in price. like walnut—it is not an excessive price that bars a supply—but heavy contractors are looking elsewhere for it for the very reason that they are obliged to. There is a large amount of Tennessee and Kentucky oak, upon which heavy freight rates are paid, distributed from the Chicago market, and the amount coming forward from those states will increase year by year.

Fashion has little to do with the use of oak. From the start it has demanded to be used, and it holds its place with a grip as strong as the wood itself. The two kinds of pine may jostle each other; white-wood may take the place of white pine; walnut may be crowded out by the other kinds of hard wood, and often by soft woods; in fact, most of the

soft woods, in their uses, are subject to the caprice of taste, but oak stands sturdily by and refuses to yield. For cars, staves, agricultural implements, for a hundred and one things, in fact, it must be had. The discovery of forests of other woods does not affect its value. There has never yet been any material discovered or invented that will take its place, and we feel tolerably safe when we say there never will be. It is one of the few indispensable woods.

We doubt if today there is a market in the world that is not demanding good oak. Throughout the foreign countries the call is so large that it cannot be filled. English car builders are buying car sills on track in Canada, and their operations would be extended to the States if they could find responsible parties with whom to make contracts. The inspection is severe, and that stands in the way of the American manufacturer, for, as a rule, he does not like to be bound by specific specifications. He delights to take a go-as-you-please gait, and the result is that his lumber often is not up to the requirements of the purchaser. The exact methods of the white pine manufacturers of the Northwest he has not learned.

Norfolk and the Norfolk & Western RR.—Under the headings of "From the mountains to the sea" and "The prosperity of the Norfolk & Western Railroad," the Norfolk Virginian of the 2nd says:

Norfolk is destined at an early day to be one of the most important coaling stations on the Atlantic coast, and the Norfolk & Western RR. Co. is pushing forward its work in this direction with the greatest possible speed.

The developments in the New River country, whence the company gets its coal, will be increased to a producing capacity of 50,000 tons per month, and during the year to 75,000 tons, against 30,000 tons per month at present, and new equipments will be placed on the road to meet the increased demands. This for the mountains. At the seaport, the work goes bravely on. The piers at the Norfolk & Western depot in this city were found to be entirely inadequate to the demands in this direction, and the Norfolk Terminal Co. is now constructing a railroad from the present terminus around the northern limits of the city to Lambert Point, some three or four miles down the river. The road bed is to be eighty feet wide with double tracks and at its terminus will be erected a series of coal, cotton and grain piers. The first pier is now erecting and will run out half a mile into the river towards Lambert light. It will be fifty feet above high water, equiped with every modern appliance and equal perhaps to any similar structure in the world. Lambert Point is some half a mile nearer the capes than Newport News, and its harbor is not surpassed in the world. The work will be completed and ready for business by the summer. In addition to the piers mentioned, the company has contracted with Messrs. Reynolds & Bro. of this city, to erect a grain elevator at Lambert point, with a capacity of 25,000 bushels.

The mineral business along the Shenandoah Valley line is to receive special attention this year. It is said that new capital is constantly flowing into that region, and that the vast mineral wealth of the country is rapidly developing. As an evidence of this fact, it is stated by President Kimball that the tonnage over the Shenandoah Valley road in 1883 was 255,863 tons greater than in the previous year. The mineral tonnage is estimated as follows: Iron ore, 107,839 tons; pig and finished irons, 32,527 tons, and coal and other minerals, 64,474 tons. These ores are said to be very fine, yielding from 55 to 57 percentage of iron, and are used in the largest establishments at the North, among others the celebrated Pennsylvania steel works.

The Norfolk & Western is in excelent condition in every way, and Norfolk must share its prosperity.

Ohio & Guyandot Railroad.—The directors of the Ohio & Guyandot Railroad Co. elected on Monday last, have organized and elected the following officers: president, A. D. Smith; vice-president, and manager, J. H. McCreery; secretary, W. L. Vankirk; general solicitor, Hon. J. M Layne, of Huntington, W. Va, chief engineer, Jonathan Barrett. This line extends from Ceredo, W. Va., near the line between Kentucky and West Virginia, southerly to a point where connection is to be made with the Norfolk & Western road, and by that line to the seabord at Norfolk, one of the best coaling points on the Atlantic coast. Connection is also to be made with the Cincinnati & Western road, a line now building from Cincinnati. This will open a new line from Cincinnati and the West to the seaboard, and it is thought that Norfolk will thus become a great point for grain as well as for cotton and tobacco.

The valuable coal owned by the Ohio & Guyandot RR. Co. is to be opened at once, so that on the completion of the road it will be ready for shipment to market. This company owns about 25,000 acres of what is claimed to be the best coal in West Virginia. It also controls large deposits of black band, carbonaceous and red hematite iron ores.

The contractors, a New York construction company, will commence work by March 1, when it is expected to push the work along rapidly, provided the weather will permit. The contract calls for the completion of the road by Jan. 1, 1885, but it is believed that the road can be taken off the hands of the contractor by Oct. 1, 1884.

Quite a number of Pittsburgers are interested in the scheme, many of whom are owners of large fields of lumber and coal, and an early and active development of the same may be expected upon the completion of the road. The principal officers of the company, as will be seen above, are Pittsburgers.—*Pittsburg Dispatch.*

Condition of Virginia Blast-furnaces Jan. 1, 1884.—The Iron Age, of New York has published a table showing the condition of the blast furnaces of the U. S. Jan. 1, 1884; from that we take the following figures for Virginia and West Virginia, and the United States.

Charcoal furnaces.	Va.	W. Va.	U. S.
Total number of stacks	31	6	251
Number reported in blast	3	....	78
Capacity per week, tons	135	....	8,936
Number reported out of blast	28	6	169
Capacity per week	1,352	625	16,008

Bituminous or Coke furnaces	Va.	W. Va.	U. S.
Total number of stacks	13	7	227
Number reported in blast	6	6	101
Capacity per week, tons	3,021	2,480	45,365
Number reported out of blast	7	1	123
Capacity per week	1,740	160	41,967

In addition to the above there are in the U. S., using anthracite for fuel, 231 stacks, of which 109 were in blast having a weekly capacity of 28,824 tons; and 122 were out of blast, having a weekly capacity of 25,555 tons.—There are no anthracite furnaces in the Virginias.

On page 6 of *The Virginias* for 1883 is the Iron Age report of the condition of Virginia blast-furnaces Jan. 1, 1883. By that report it appears that Virginia has 7 fewer charcoal furnaces and one more coke furnace in blast Jan. 1, 1884 than Jan. 1, 1883; and while the producing capacity of her coke furnaces in blast Jan. 1, 1883, was 1,460 tons per week, it was 3,021 tons per week Jan. 1, 1884,—*a solid gain of over 107 per cent* during 1883.

Most of Virginia's charcoal furnaces are generally out of blast, as a rule, on the 1st of Jan., so they always make a bad showing in reports of that date, but the general result is

very satisfactory, for by the reports refered to all the blast-furnaces in Virginia out of blast Jan. 1, 1883, had a capacity of 4,447 tons, while all those out of blast Jan. 1, 1884, had a capacity of but 2,092 tons,—a gain of 1,255 tons a week in the general condition of production Jan. 1, 1884, over Jan. 1, 1883.

West Virginia was reported as having one charcoal and 5 coke furnaces in blast Jan 1, 1883; she had the same number of furnaces in blast Jan. 1, 1884, only they were all coke, and the general result was, for all her blast furnaces, a productive capacity of 188 tons per week more Jan. 1, 1884 than Jan. 1, 1883.

The Virginia coke furnaces in blast Jan. 1, 1884, were: Gem, Lynchburg and Crozer, on Shenandoah Valley and Norfolk & Western railways, and Victoria, the two Longdale, Callie and Low Moor on Chesapeake & Ohio Ry.

Comparative Value of Fuel containing Different Percentages of Ash and Carbon.—The following table shows the relative values of fuel used in furnace practice, either coal or coke, with different percentages of ash. Values are given in dollars and cents.

Percentage of Carbon.	Percentage of Ash.												
	2	3	4	5	6	7	8	9	10	11	12	13	14
75	.....	.....	.....	.....	.....	.....	$2.83	$2.82	$2.80	$2.79	$2.77	$2.76	$2.74
76	.....	.....	.....	.....	.....	.....	2.88	2.86	2.84	2.83	2.81	2.79	2.78
77	.....	.....	.....	.....	.....	$2.93	2.91	2.90	2.88	2.87	2.85	2.84	2.82
78	.....	.....	.....	.....	.....	2.97	2.95	2.93	2.90	2.88	2.86	2.84	.....
79	.....	.....	.....	.....	$3.01	2.99	2.97	2.96	2.94	2.92	2.90	2.88	.....
80	.....	.....	.....	.....	3.06	3.04	3.02	3.00	2.98	2.96	2.94	2.92	.....
81	.....	.....	.....	.....	3.10	3.08	3.06	3.04	3.02	3.00	2.98	.....	.....
82	.....	.....	.....	$3.17	3.15	3.13	3.10	3.08	3.06	3.04	3.02	.....	.....
83	.....	.....	.....	3.21	3.19	3.17	3.14	3.12	3.10	3.08	3.06	.....	.....
84	.....	.....	.....	3.25	3.23	3.21	3.18	3.16	3.14	3.12	.....	.....	.....
85	.....	.....	$3.33	3.31	3.29	3.26	3.23	3.20	3.18	.....	.....	.....	.....
86	.....	.....	3.37	3.35	3.33	3.30	3.27	3.24	.....	.....	.....	.....	.....
87	.....	.....	3.41	3.39	3.37	3.34	3.32	3.29	.....	.....	.....	.....	.....
88	.....	$3.46	3.44	3.42	3.39	3.36	3.33	.....	.....	.....	.....	.....	.....
89	.....	3.49	3.47	3.45	3.43	3.41	.....	.....	.....	.....	.....	.....	.....
90	$3.54	3.52	3.51	3.50	3.48	.....	.....	.....	.....	.....	.....	.....	.....
91	3.58	3.57	3.56	3.54	3.52	.....	.....	.....	.....	.....	.....	.....	.....
92	3.63	3.61	3.59	3.57	.....	.....	.....	.....	.....	.....	.....	.....	.....
93	3.68	3.66	3.64	3.61	.....	.....	.....	.....	.....	.....	.....	.....	.....

Note.—The carbon and hydrogen are counted as carbon. Sulphur generally runs about one-tenth of the ash, but fuel containing over one per cent of sulphur must not be used for making iron economically. John M. Hartman.

We copy the above valuable table from the Bulletin of Am. Iron & Steel Association. Its author is a well known blast-furnace engineer whose statements are accepted as reliable.

The practical use of this table may be illustrated as follows: On page 40 of Vol. IV of *The Virginias* in a paper by Mr. John Fulton, M. E., it is stated that Connellsville coke contains 9.113 per cent of ash and 89.576 of carbon and West Virginia coke 6.680 per cent of ash and 92.181 of carbon; by the above table on the basis of these percentages, taking the nearest figures, (though we cannot understand why the table was not carried out), when Connellsville coke is *intrinsically worth* $3.41 per ton then West Virginia coke is *intrinsically worth* $3.57. The case appears still better if we take figures from other sources; for example: On page 137, of same volume, we give an analysis of Flat-top, Va., coke, showing 93.84 per cent fixed carbon and 5.28 ash; comparing this with Mr. Fulton's Connellsville, by above table, Flat-top coke would be worth $3.61 when Connellsville brings $3.41,—a difference that coke-makers, in some places, would be glad to realize just now as a profit.

We call on Mr. Hartman to finish his table. It looks badly, to say no more, as it now stands.

Production of Pig Iron in Va., W. Va., and U. S. in 1882 and 1883.—In the Bulletin of the American Iron and Steel Association for Feb. 6, 1883, are given the statistics of the production of pig iron in the several states of the U. S. during the years 1882 and 1883,—from these we select the following figures for Va., W. Va. and the U. S.

Total Production of Pig Iron.

	Va.	W. Va.	U. S.
Furnaces in blast:			
Jan. 1, 1884.....	12	6	307
Jan. 1, 1883.....	15	5	417
Production in 2000 lbs. tons:			
Production in 1883.	152,907	88,398	5,146,972
Production in 1882.	87,731	73,220	5,178,122

Productiou of Charcoal Pig Iron.

	Va.	W. Va.	U. S.
Furnaces in blast:			
Jan. 1, 1884.....	5	....	84
Jan 1, 1883.....	12	....	129
Production in 2000 lbs. tons:			
Production in 1883..	16,879	....	571,126
Production in 1882 .	26,133	....	697,906

Production of Coke and Bits. Coal Pig Iron

	Va.	W. Va.	U. S.
Furnaces in blast:			
Jan. 1, 1884.....	7	6	105
Jan. 1. 1883.....	3	5	127
Production in 2000 lbs. tons:			
Production in 1883,	136,028	88,398	2,689,650
Production in 1882,	61,598	73,220	2,438,078

The relative rank of the 12 leading states in the production of pig iron in 1882 and 1883, by these tables, was as follows:

	1883.	1882.		1883.	1882.
Pennsylvania.....	1	1	Virginia.....	7	10
Ohio.....	2	2	New Jersey.....	8	6
New York.....	3	3	Tennessee.....	9	7
Illinois.....	4	4	Missouri.....	10	8
Michigan.....	5	5	West Virginia.....	11	12
Alabama.....	6	9	Kentucky.....	12	13

The striking features of this showing of relative rank in iron production are: That the only states of these 12 that produced more pig iron in 1883 than they did in 1882, were Pennsylvania, Alabama, Virginia and West Virginia. Michigan came near having to yield its 5th rank to Alabama, as 721 tons would have placed the latter above it.—Virginia advanced from the 10th to the 7th place, supplanting Tennessee and passing over Missouri and New Jersey. West Virginia gained one place, passing from the 12th to the 11th, which latter Wisconsin held in 1882.

Virginia ranked in the production of iron, among the States, 13th in 1870, 16th in 1880, and 7th in 1883; we confidently expect that she will occupy at least the 4th, if not the 3rd place in 1885, and by the next U. S. census, that of 1890, she will reach her proper place—that to which she is fairly entitled by her resources and her position—as the leading iron producing state of the Union.

In the stocks of all kinds of pig iron on hand, West Virginia is credited with 4,268 tons Jan. 1, 1883, and 1,900 Jan. 1, 1884; Virginia, North Carolina, Georgia and Texas are grouped and stated to have had 25,064 tons Jan. 1, 1883, and 30,601 tons Jan. 1, 1884. The stocks of the U. S. are reported as 429,694 tons Jan. 1, 1883, and 533,800 Jan. 1, 1884. We cannot understand why the editor of The Bulletin persists in grouping Virginia with North Carolina, Georgia and Texas, the first of which produced no pig iron in 1883, and the third but a small quantity. We submit that Virginia is entitled to a separate showing, as much as New Jersey, for example, which now ranks below her in production.

The present duty on pig iron is as low as the iron makers of Virginia can stand and keep the furnaces in blast at a small profit with pig iron selling at the prices it now does in the great iron consuming centres of the country. According to a report in the "American Manufacturer," of Pittsburg, from its admirable English correspondent, on the 18th of Jan., 1884, the price of pig iron, delivered on ship board, on the Clyde, was 44s 6d to 44s 7d per ton, that is from $10.77 to $10.79. The rate of freight, at the same date, from Scotch ports to New York, was 4 shillings, or 97 cents per ton. So Scotch pig iron would cost, at that time, delivered in New York, $11.74 to $11.76 per ton:

We know as a fact, no matter what anyone may say to the contrary, that there is not a single blast furnace in Virginia, or anywhere else in the United States, that can afford to make pig iron and put it on railway cars. if these are at the cast-house doors, for any such price as $11.76 per ton. We believe that the Shenandoah Iron etc. Co., at Milnes, on the Shenandoah Valley RR., can make pig iron as cheaply as it can be made anywhere in this state—or in any other state—because it has an abundance of high grade ore that is cheaply mined, good labor at moderate wages, competition in coke, etc., etc , and yet we reported, last November (p 168 of *The Virginias* for 1883) that the pig iron made at its new Gem furnace, during six months of its blast from Feb. 1, cost $12.98 per ton on the cars at the furnace, or *$1.22 more* than the Scotch iron could have been bought for in New York if it paid no duty. If the Gem furnace iron seeks a market in New York it must be carried, by railway, over two systems of roads, not less than 350 miles, adding fully $3.50 to its cost per ton, delivered alongside the imported article. In other words, the Virginia pig iron, made where it can be produced most cheaply, will actually cost, delivered in New York, $16.38 per ton where an imported pig could be purchased at $11.76, or $4.62 less per ton, but for the present duty. Add that duty and you have left *less than 50 cents a ton profit* for the most highly favored Virginia iron masters and not only no profit but an actual loss to the majority of them, for we must put the actual cost of production, all things counted in, at from $12.50 to $15 per ton Even all the Alabama producers but one, in a formal official paper, stated that it cost $15 to make pig iron in that paradise for iron masters.

And yet, in the face of these indisputable facts, we have ably conducted newspapers in the Virginias, newspapers that derive their support from regions that are natural iron producing centres, that are not only willing but anxious to have the duty removed from pig iron, reasoning that if that were done the iron masters would be forced to come here to make iron if they would make it at a profit anywhere in the United States! This is no time for theorizing, especially on false data. Now is the time to organize and build up the iron industry in Virginia but we cannot do it by demolishing the fabric of American iron industry. If that falls for the want of a sustaining protection we fall with it. It is a delusion to think otherwise. Our state is dotted over with the ruins of old time charcoal blast-furnaces that went down under the free-trade floods of former years, just as they did in other states, and now our modern coke furnaces will meet the same fate if we accept and follow the delusive doctrines of the free-traders of today. *We in Virginia* need more protection, not less, if we would have more furnaces and more iron industries of all kinds. We should demand a duty of not less than $8 per ton on pig iron, $1.50 on iron ores and $1.25 on bituminous coal, and no rebates, and that for the benefit of all classes of our industries and all of our people.

In this connection we would invite attention to the following letter from Mr. A. A. Low, of New York, addressed to the Huntington, W. Va., "Advertiser," and which appeared in that paper Jan. 12, 1884. Mr. Low has probably made more investments in Virginia and West Virginia mineral lands, furnaces rolling mills, nail-works, car-works, railways, etc., etc., than any other one man, and by his example and influence has induced others to invest largely in these things in the Virginias. We do not hesitate to call him, in the largest and best sense of the word, a benefactor of our states, a "liberal man that has devised liberal things" for our benefit. We heartily wish that hundreds of such men would become interested here, and if we are wise, if we are prudent, if we really desire the prosperity and upbuilding of the Virginias, we will one and all give heed to his words of sound discretion and practical sense.—Mr. Low is one of the largest stockholders in the great Low Moor furnace, in Alleghany county, Va.

Under date of New York city, Dec. 28th, 1883, Mr. Low writes to the Editor of the "Advertiser":—

In your paper of Dec. 22d, after quoting from the Wheeling *Evening Journal*, you say:

"Now we propose to play such a game of tariff reform as to put our people and the state in a position where it will become a necessity to build furnaces and make iron in our own hills. In other words we intend to care for ourselves in this matter.

When we find the iron masters of other states interesting themselves for us and disposed to help us in our affairs, then we will be interested in returning their favor; but until this changes we intend to be as selfish as they have been and are. We go further and say that we are willing to make the tariff on foreign iron $2.50 per ton for the purpose of raising revenue for the government, allowing everybody interested to have the benefit of this amount in the way of incidental protection; but, we repeat, we are not willing to pay so extravagant a rate as to prohibit the development of our own territory in the manner illustrated above." You had previously said, "in an even game our iron ores, with the coal and limestone grouped together, can be turned into iron at $9 to $12 per ton. At this cost we can compete with foreign iron which costs $11 to $13 delivered in New York."

As your editorial aim is to instruct your fellow man, let me add a thought or two of a practical character to what you have written. For some years I have been interested in the manufacture of iron in old Virginia, and have outlived the delusion so common as to the actual cost of iron manufacture in that favored region, and am very sure, that, with such a tariff as you advocate, you will be left free to "breathe the air of your hills" undisturbed by the smoke of the blast furnace. At least you will not be offended by the introduction of Northern capital for the establishment of such industries, and for the infliction of such a wrong on your state.

What, however, I wish to say is this, viz: that at the present time one of the best markets for Virginia iron is New York, and the cost of geting iron here is $3.50 and $4 per ton. Now, English and Scotch iron can be delivered here by foreign steamers almost free of charge, it being a necessity for them as ballast. What "incidental protection" then, would there be in a duty of $2.50 per ton for iron made in Virginia and sold in the market of New York? In Cincinnati, Alabama can wage a more than successful competition with Virginia. As you are aware the popular outcry now is "overproduction." The popular remedy with anti-protectionists is the introduction of foreign goods, for markets like our own overcrowded with the products of labor still cheaper than ours. Is it to be accepted as a truth, that when our laws cease to protect American industries, we shall be able to cope in distant markets with the older nations of Europe, who stand ready to deluge ours with their cheaper merchandize, the product of the highest skill and of labor too poorly paid?

The Resources of S. W. Virginia.—In a recent issue of the "American Manufacturer" of Pittsburg, Pa., we find the following interesting article, which we recognize as from the pen of Mr. O. Barrett, formerly of Pittsburg, Pa:—

We published, in November, under this head, a brief sketch of the unequaled mineral deposits of this section, generally within twenty miles of Abingdon. The following is a continuation of the subject from the same writer, who has for several years been examining the characteristics of this region: —"Looking at the map of Virginia it will be seen that the great area of country north and south of the Norfolk & Western railroad west of Lynchburg is without a railroad, or even a macadamized road. This want of all modern methods of transportation is one of the many reasons why the enormous resources for the creation of wealth, consisting of iron, coal, copper, zinc, marble, gypsum, salt—among the abundant mineral deposits hereabouts—and of poplar, pine, walnut, cherry, &c., in the heavy forests that darken a great extent of the boundless mountain regions of this portion of our country, remain almost unknown or unnoticed by the capitalists of the United States and Europe.

"The southern edge (that which is nearest the Atlantic coast) of the Great Kanawha coal basin is nearly parallel to the Norfolk & Western railroad for about 100 miles, and at some points about 30 to 40 miles north of that railroad, not more than 35 miles from Abingdon, there are five seams of coal, all above water level, nearly horizontal—4, 4½, 5, 8 and 13 feet thick. Three of these seams (4, 8, 13,) are known to make good coke. The 5-foot seam is excelent splint coal, and one of the best coals known for household purposes.

"Cheap mining is one of the attractive features of this coal-field; within a few miles, and at some places overlying these coal measures, are excelent brown iron ores, (limonite). Along the north side of the valley of the Clinch river, forming the southern boundary of the coal field to the great geological fault, which by the upheaval brought the limestones of the Lower Silurian period, holding these excelent (limonite) brown ores, against, or overlaping the coal measures. Here you have coal (good for coking), iron ore, limestone, all on the same ground, which enable the manufacture of iron or steel so cheaply as to defy competition. The following reliable figures show the cost of making pig iron here:

2 tons ore at $1 per ton	$2.00
80 bushels coke at 4c	3.20
Limestone 25 cents to ton of iron	.25
Salaries, labor, interest, &c., per ton of iron	2.50
	$7 95

This is estimating the iron ores at 50 per cent, and no transportation allowed on any material for iron making. This condition is not at all points on this line, but does exist at some few other places, where raw materials centre.

"Another estimate allowing the ore to be 40 per cent, and allowing for short transportation of ore or coke, and more than average cost in mining ores:

2½ tons ore at $3	$7.50
80 bushels coke at 4c	3.20
Limestone	.25
Salaries, labor, interest, &c., per ton	2.50
	$13.45

"It is safe to say that pig iron can be made here at $10.50 per ton. There are many points along the Clinch mountain range in the valley of North fork of the Holston river, and from 10 to 15 miles north of the Norfolk & Western railroad, where charcoal pig iron (cold blast car-wheel) can be made at the following cost:

2½ tons iron ore at $2 per ton	$4 50
140 bushels charcoal at 4c	5.60
Limestone	.25
Salaries, labor, &c	2.50
	$12.85

Or as follows:

2½ tons ore at $2 per ton	$5.00
150 bushels charcoal at 5c	7.50
Limestone	.50
Salaries, labor, &c	2.50
	$15.50

Or as follows:

2 tons of ore at $1 per ton	$2 00
140 bushels charcoal at 4½c	6 30
Limestone per ton of iron	.25
Salaries, labor, &c	2.50
	$11.05

"These estimates vary according to locations and condition of ore and fuel. There are vast forests that will yield in cut hard woods 50 cords to the acre, that can be bought at from one to three dollars per acre, as can also the land containing the rich ore beds at the same price.

"By many analyses the iron ores of this region, including limonite, fossil, specular or red, and magnetic iron ores, contain of metalic iron from 40, 50, 55, 60, 65 to 68 per cent of iron, and of phosphorous and sulphur none, or but a trace occasionally. Many of these are strictly Bessemer steel ores.

"Along the continued strata of Upper Silurian sandstones and shales, are equally continuous bands or deposits of limonite ore in the Oriskany sandstones and fossil ore in the shales and sandstones of the Clinton group; and in the lower or lowest of the Silurian limestones are found the red and specular iron ores of great richness and purity; and at a still lower geological horizon are found the magnetic iron ores. Many of these bands or deposits, or veins of iron ores, in quantity or extent are worthy of being mentioned or classed with the most extensive deposits of this continent

"Most, if not all of the south side of the great Clinch Mountain range may be said to be an unbroken forest of valuable hard wood timber; and north of Clinch river there are immense bodies of timber of miles in extent that stand in their primitive gigantic growth, untouched by the axe; and here the white oak and poplar or tulip reach their greatest magnitude. Here trees are numerous 6 feet in diameter and 60 feet or more to the first limb. Here are also black oak, red oak, chestnut oak, hickory, black walnut, chestnut, locust, ash, basswood, cucumber tree, buckeye, sugar maple, and hemlock. South of the Norfolk & Western railroad, and between it and the Tennessee and North Carolina state lines, and extending into those states, are extensive forests of white pine, white oak, chestnut oak, and red oak, hemlock, poplar (tulip tree), ash, cherry, &c. All the points refered to are almost within sight of contiguous high grounds near this place, so that all may be cited as not remote, or even beyond eye-sight along the mountain ranges. The bark produced by the chestnut oak of this region, by its superior properties, offers great inducements for the establishment of tanneries, as the quality is not surpassed and the supply can be scarcely estimated; and it is cheaper to bring hides to the bark than to carry bark to the hides.

"Perhaps there is no country on this continent so well watered as southwest Virginia. The creeks and rivers flowing from the mountains and ridges, descending from twenty to one hundred feet to the mile, afford falls and water-power

enough to turn all the machinery of New England. The streams are constant, varying but little from winter to summer. The mountain ranges are high. The Clinch mountains rise to 4,000 feet above tide, the Holston mountains to 3,500 feet, and the Iron Mountain range as high as 5,400 feet. The Norfolk & Western railroad depot at Abingdon is 2,000 feet above tide.

"The climate is very healthful and mild. There is no better or more pleasant summer and autumn climate than this—the temperature rarely going above 85°; and the winters are free from protracted cold and snow and ice—a happy medium between extremes of north and south.

"Not only is this a point for making cheap pig iron, but also a point that has great advantages for manufacturing iron in all its merchantable shapes, such as rails, car wheels, bar iron, castings, nails, &c. There is as good and as cheap material for coke here as at Pittsburg and Connellsville; all grades of pig iron can also be made at a cost of from 33 to 50 per cent less than at Pittsburg. The south and southwestern states must have more roads, and thus afford extensive outlets for rails; this will give a commanding prominence to the region nearest to the largest demand; and rails will be worth from three to five dollars per ton more than at Pittsburg, Johnstown or Harrisburg. All charcoal pig iron must be fully 50 percent lower in price, when the manufacture is extensively entered upon, and there is no higher grade known in the market than that which is produced in this region. To give fair opportunities for the development of this region, a few short railroads are needed to bring together and connect the iron and coal mines; and longer lines extending to the roads of northern and eastern Virginia, North Carolina, Tennessee and Kentucky are (or will be) demanded to facilitate the heavy intercourse that must rapidly spring into existence when the teeming treasures of this region are brought out by capital and labor. With all these enumerated advantages, competition with England can be profitably maintained without import duties. Many eyes are turned this way, and it cannot be long ere the richest mineral district in the world ceases to lie untouched."

(Concluded from page 20.)

No. VIII.—The Eighth District.

Counties.	1881. Daniel.	1881. Cameron.	1883. Democrat.	1883. Coalition.
Loudoun	2,221	1,323	2,286	1,267
Fairfax	1,526	1,666	1,801	1,469
Alexandria	1,492	1,306	1,993	1,313
Fauquier	2,140	1,423	2,263	1,338
Culpeper	1,596	1,251	1.476	1,139
Orange	1,000	654	1,260	1,062
Louisa	971	984	1,434	1,594
King George	362	796	579	699
Stafford	649	810	708	745
Prince William	891	396	998	570
Totals	12,448	10,553	14,798	11,196
Dem. maj.	1,895		3,602	

Alexandria city is included in Alexandria county.

No. IX.—The Ninth District.

Counties.	1881. Daniel.	1881. Cameron.	1883. Democrat.	1883. Coalition.
Lee	642	1,215	1,253	1,290
Scott	343	1,354	1,292	1,597
Wise	186	744	755	419
Dickenson	35	485	320	258
Buchanan	30	375	199	396
Russell	346	1,087	900	1,475
Washington	1,498	2,258	2,632	1,993
Smyth	693	1,138	1,052	1,055
Bland	217	642	492	517
Tazewell	634	1,389	1,010	1,717
Wythe	1,240	1,401	1,521	1,229
Pulaski	782	552	890	661
Giles	718	625	895	578
Craig	361	254	630	75
Totals	7,725	13,519	13,841	13,260
Coalition majority		5,794	581 Dem. maj.	

No. X.—The Tenth District

Counties.	1881. Daniel.	1881. Cameron.	1883. Democrat.	1883. Coalition.
Augusta	2,973	1,945	4,015	2,690
Highland	330	490	519	482
Bath	259	290	483	394
Alleghany	231	217	674	444
Rockbridge	1,632	1,573	2,196	2,050
Amherst	1,580	673	1,861	981
Nelson	1,231	1,094	615	1,130
Appomattox	740	858	873	880
Buckingham	928	1,196	1,275	1,508
Fluvanna	802	796	1,064	800
Cumberland	429	937	618	1,021
Totals	10,835	10,069	14,193	12,380
Dem. maj.	766		1,813	

Staunton city is included in Augusta county.

Recapitulation.—The following table gives the population of the above districts in 1880, and the majorities of the candidates named in each district in the years given:

Districts	Population in 1880.	1881. Daniel.	1881. Cameron.	1882. Wise.	1882. Massey.	1883. Democratic.	1883. Coalition.
First	142,924	368	.....	.....	.....	1,100	
Second.	153,159	.....	4,555	2,330	.....	.....	704
Third...	150,931	1,446	.....	.....	.....	3,494	
Fourth.	158,269	.....	7 828	9,451	.....	.....	4,177
Fifth....	146,061	.....	851	.....	868	4,226	
Sixth...	162,308	1,585	.....	.....	591	4,828	
Seventh	148 670	2,976	.....	.....	963	3,114	
Eighth..	148,388	1,895	.....	.....	3,240	3,602	
Ninth...	148,664	.....	5,794	2,613	.....	581	
Tenth...	158,152	766	.....	.....	516	1,813	
	1,512,515						

Attention is called to an apparent mis-statement in an article on the Tariff in another column, page 22. We took in our comparison a duty of $6 per ton on pig iron. That was the duty in the act of 1861 and will be the duty if the Morrison bill becomes a law. The duty under the act now in force, that of 1883, is $6.72. The secretary of the N. Y. Metal Exchange, as reported by the American Manufacturer, figures the duty under the Morrison bill as $5.38 per ton.

"Southern Journalistic Enterprise.—The Virginias, the wide-awake mining, industrial and scientific journal published at Staunton, Va., contains in its last issue three handsome colored maps of Virginia and West Virginia, giving the lines of mean annual temperature, the distribution of mean temperature for July, "the hotest month of the year in the Virginias," and the zones of mean temperature for January, the coldest month of the year. Besides these instructive maps there is an excellent railway map, showing the various trunk lines, branches and feeders actually constructed on January 1, 1884 The Virginias is undoubtedly one of the most progressive industrial publications in the South and we say this in spite of the fact that it insists on spelling all its words phonetically. Doubling letters, The Virginias says, is "maring the simplicity of our noble language." Yet it spells "correct" correctly."—*Baltimore Sun*, Feb. 18, 1884.

We are very much obliged to our highly esteemed cotemporary for the above very appreciative notice of *The Virginias.* The applications for the number refered to, that are coming in from all directions, show how widely "The Sun" is circulated and how its statements are relied on.

"The Sun" does not, however, understand our position on the *spelling* question. We do not believe in phonetic spelling. We are in favor of doing fully what "The Sun" does partly. For example: in the copy of "The Sun" from which the above extract is taken there is an article headed "Rivaling the West," etc. In that case the spelling is correct, to the root word *rival* the grammatical termination *ing* is added, but in the same column we find the word "wrapped" in which The Sun spells the simple or radical word "wrapp"; else where did the other "p" come from,—for The Sun is too erudite to contend that the preterit is formed by adding "ped" to the root word? We spell "correct" correctly because that is the *proper form* of the word. To be consistant "The Sun" ought to spell correctly "correcttly."—We see that many of our cotemporaries are adopting our common sense rule and so aiding in restoring our language to its noble simplicity. We have adopted *standard time* and *standard railway time tables*, now let us have standard spelling.

Altitudes in the Flat-top coal-field.—We are indebted to Chief engineer W. W. Coe, of the Norfolk & Western RR., for the following altitudes (elevations in feet above tide) of points in the Flat-top coal-field, determined by recent surveys made for extensions of the New River branch of Norfolk & Western RR. into the lands of the Flat-top Coal Co. on the eastern or Bluestone river side of Flat-top mountain.—The altitudes of streams are given for the summer stage of the surface of their waters.

	Ft.A.M.T
Pocahontas, railway station	2,315
Laurel creek, at Pocahontas	2,305
Laurel creek, at mouth in Bluestone river	2,270
Mill creek, at mouth in Bluestone river	2,254
Simmons creek, at mouth in Bluestone river	2,237
Flipping creek, at mouth in Bluestone river	2,215
Flipping creek, 2.5 miles up from its mouth	2,335
Crane creek, at mouth in Bluestone river	2,206
Crane creek, 4 miles up from its mouth	2,335
Crane creek, head of N. fork near Peters gap	2,660
Flat-top mountain crest at Peters gap	2,950
Pinnacle creek of Guyandot river below Peters gap	2,650

These figures will be of great present value to the numerous mining engineers and geologists that in the near future will visit the Flat-top coal-field, one that presents so many unique and everyway interesting features.

It is interesting to note that in the 10 miles from the mouth of Laurel creek to the mouth of Crane creek, Bluestone river falls but 64 feet, an average of but 6.4 to a mile. This river runs N. E., with the strike of the rocks of the Lower coal measures (No. XII), and with the trend of the Great Carboniferous escarpment of the coal basin of the Ohio. It is also noteworthy that Crane creek falls but 454 feet, trenching across the Lower coal measures rocks, at right angles to and against their dip, from the head of its North fork to its mouth in Bluestone river, a distance of nearly seven miles, or an average of about 65 feet per mile; and still more interesting is the fact, which we had previously ascertained barometricaly, that the headwaters of Guyandot river are but 10 feet below those of the Bluestone on opposite sides of a knife-edged mountain pass and but a few hundred yards apart.

Shenandoah Iron, etc., Co. in 1883.—We are indebted to Hon. Wm. Milnes, Jr., for the following facts concerning the operations of the Shenandoah Iron, etc., Co., at Milnes, Page county, Va , on Shenandoah Valley RR., during the year 1883.

Its "Gem" furnace made 13,706 tons of pig iron; it went into blast, for the first time, Feb. 1, 1883 and was in blast at the end of the year. The two new Whitwell stoves being erected at this furnace will be completed about the 1st of next April.—Its "Furnace No. 2" made 1,829 tons of pig iron in 1883; it went out of blast Aug. 1, 1883.—The bloomary or forge of this company made 962 tons of blooms in 1883.

The officers of this company are: Wm. Milnes Jr., president and general manager, A. Creveling vice-president and C. H. Price assistant secretary, Milnes, Va.; and John Milnes, treasurer, 132 Walnut St., Philadelphia, Pa.

U. S. Geological Survey work in the Virginias.—In a recent number of "Science" we find the following:—Owing to the as yet incomplete state of the topographic work in the southern Apalachians, the systematic geologic survey of that section has not yet been commenced. However, several geologic reconnaissances have been made, and considerable collections of paleontologic material have been sent into the main office of the survey. During the season of 1883 Prof. H. R. Geiger examined the geologic structure of a considerable portion of Virginia and West Virginia. During the latter part of July he was in the eastern part of Virginia, but in August transfered his field of work to Greenbrier county, W. Va., where he studied the formations that are exposed between the Greenbrier river and Lewis tunnel, just east of Alleghany station of Chesapeake & Ohio Ry., W. Va. A collection of Devonian fossils was made. In September his work was carried into Alleghany county, Va., where a careful examination was made of the rocks so well shown there. The thickness, dip, etc., of the beds were obtained, and an excelent series of typical specimens secured. In October, the field was extended northward to Rockingham county, but bad weather impeded operations. Through November a special study was made of the foldings in the limestones of Rockingham and Rockbridge counties, Va.

Prof. Ira Sayles was assigned to the northeastern part of Tennessee, and adjacent portions of Virginia and Kentucky. The early part of July was spent by him in an examination of the caves near Clinch river in Virginia.

No. 6
Supplement to
"The Virginias,"
Feb. 1884.

The Natural Grand Divisions of the Virginias are frequently mentioned in our columns and we have several times described them, especially on p. 133 of the 4th, or 1883, volume of *The Virginias*, but as it is convenient to publish on the preceding page a map—No. 6 of our 1884 series—of Virginia and West Virginia, showing the place and general outlines of these Grand Divisions, it is proper to again briefly call attention to them and their characteristics, taking them in order from the Atlantic to the northwest

1. *Tidewater Virginia*, a land and water area of about 10,850 square miles, or nearly one-fourth of the state, is Virginia's portion of the eastern marine plain of the United States, one that extends from the Atlantic coast westward to the tide-heads of the Atlantic rivers at the escarpment, mainly of granitic rocks, often called "the Ridge," on the eastern border of Midland; an escarpment that is closely followed by the line of railways from Washington southward through Alexandria, Fredericksburg, Richmond and Petersburg.

This plain is the bottom of a former sea raised above the ocean level and eroded by the agency of water into peninsulas almost endless in number and form. Its surface consists of flat water-shed ridges, or divides, from which the land descends by slopes and terraces, or benches, to the flats, bottoms, or low-grounds, salt-marshes or swamps that border the outline of the waters of its arms of the sea and its tidal rivers.—This grand division is divided into 30 counties.

The meridian of 76° 30′ very nearly divides the Tidewater country into two distinct regions or marine plains: (1.) *The Eastern*, the one that includes the north-and-south trending peninsulas, those of the Eastern shore, Norfolk, Mathews, etc. This is a low-lying region, varying in elevation from the sea level to about 12′ above that level; these peninsulas are deeply cut by oceanic waters and bordering islands are numerous. This plain is the first step or lowest land of the state, its newest or latest formed territory, geologically speaking, an Upper Tertiary country. This is the "trucking" or garden region of the state, the one having a somewhat insular climate. (2.) *The Western* marine plain, the larger region that includes the northwest-southeast trending peninsulas and the rivers that separate them. It has a broken and greatly varied surface, ranging in altitude from the sea-level to 100′ (rarely 150′) above that level. Its surface is made up of flat watershed ridges, slopes, and several terraces, deeply trenched by secondary drainage. It is mainly Middle Tertiary in the east and Lower Tertiary in the west. The cotton and peanut belts of Virginia are on this plain.

2. *Midland Virginia*, a country some 12,470 square miles in extent, nearly three tenths of the state, is the undulating plain, triangular in shape, that extends from the Tidewater escarpment westward to the low, interrupted Coast-range mountains and the large northeast-southwest turns of the rivers on the eastern border of Piedmont. It is divided into 25 counties.

This is part of the great undulating higher plain of the Atlantic slope, the surface of which varies in altitude from 100′ feet to 200′ in the east to from 400′ to 700′ in the west. Plain-like and undulating as a whole it is often broken by deeply eroded stream valleys and in places varied by isolated hills or low mountains, especially in the west where Willis mountain rises to 1,170′ and Spear to 1,629′ above tide. The main watersheds are generally wide and nearly level and the streams are bordered by bottoms of varied extent. It is mostly underlaid by Archaean, granitic or metamorphic rocks, inclined at high angles and striking northeast-southwest. It has a number of island-like areas of Jura-Trias or Mesozoic rocks. With Piedmont and the Blue Ridge it is the oldest land in the state. In this are the so-called "fine tobacco" regions of the state.

3. *Piedmont Virginia*, a region some 7,000 square miles in extent, about one-seventh of the state, extends from the western border of Midland to the irregular eastern border of the Blue Ridge and its eastward extending spurs; it is some 250 miles long and from 20 to 30 miles wide. This land of mountains, hills and valleys, of endless forms of relief, varies in the altitude of its valleys from 300′ to 500′ in the east to 700′ and 1,000′ in the west. Its mountains and hills trend northeast-southwest; these are carved into numerous spurs and cross-ridges, at right angles to their general course, by southeastward flowing streams. Its stream valleys are in many respects the most attractive portions of Virginia. The Coast-range mountains are generally near its eastern border; they vary in altitude from 1,095′ in Clark and 1,374′ in Bull Run to 2,045′ in Smith and 3,188′ in Bull mountains. It is divided into 14 counties.

4. *The Blue Ridge* as a natural grand division is the great double ranged and much spured mountain chain and its plateaus that extends in a northeast-southwest direction diagonaly across Virginia for over 300 miles. Its base, from spur-ends to spur-ends, at right angles to its trend, is from 3 to 30 miles wide; its surface varies in altitude from 240′ in the Potomac gap to 5,700′ in Mount Rogers, the highest peak in Virginia—heretofore called Balsam mountain, a name given to numerous points in the Blue Ridge, but which we propose to hereafter call Mount Rogers, in honor of Virginia's great geologist, William Barton Rogers.

In the southwest this is a large, rolling, river-basin plateau, that of the sources of the Great Kanawha, there called New river, that has a general surface elevation of from 2,500′ to 3,000′ above the sea-level, from which peaks and knobs rise to various altitudes up to 5,700′. Thence to the northeast the crest of the Blue Ridge divides the counties of The Valley from those of Piedmont and it forms part of the territory of the counties on each side.—The area of the Blue Ridge as a natural grand division is fully 1,200 square miles. It is a region rich in undeveloped resources.

5. *The Valley of Virginia* as a natural grand division is the belt of plateau-like or mountain-valley country, underlaid by Lower Silurian limestones, slates, etc., that lies between the Blue Ridge and the Apalachian mountain country. Its length in the Virginias is about 330 miles and its average breadth about 16, making some 5,000 square miles of surface varying in altitude from 500′ to over 2,500′ and having an average elevation of 1,000 above the sea.—Its surface and part of the adjacent Blue Ridge on the east and of Apalachia on the west, some 7,500 square miles, is divided between the 15 Valley counties of Virginia and the 2 of West Virginia. It is a region noted for the fertility of its lands and the beauty of its scenery.

6. *Apalachia* is the belt of parallel valleys and mountains country through which runs the irregular boundary line between Virginia and West Virginia; its natural western boundary is the Great Carboniferous escarpment that is known along its broken trend by various names, as Cumberland, Big Stone, Dividing ridge, Great Flat-top, Greenbrier and Alleghany front ridge mountains. Its valley vary in altitude from 800′ to 2,800′, and its barrow-like mountain ranges from 1,200′ to about 5,000′. There is great variety in the features soils and productions of this region.

About one-sixth of the territory of Virginia, some 7,400 square miles, divided into 10 counties, is included in Apalachia. Of the counties of West Virginia 11 are in this grand division, and their area is nearly the same as that of the Apalachian counties of Virginia

N B. Too late for correction we discover that the shading for Trans-Apalachia on map No. 6 stops at the Guyandot in West Virginia; it should extend to the Big Sandy.

(To be continued.)

The Virginias.

Serial No. 51. Vol. V.—No. 3.

Staunton, Va., March, 1884.

Jed. Hotchkiss, Editor.

The Pocahontas Coal Mine Explosion.

Nothing has ever occured in the mining history of Virginia that has attracted so much attention and elicited so much comment, both wise and unwise, as the great calamity, in the form of an explosion, that took place in the East coal mine of the Southwest Virginia Improvement Company at Pocahontas, Tazewell county, Virginia, at about half past one o'clock of the morning of Thursday, March 13th, 1884, which occasioned the death of at least 114 miners, mine bosses, and others employed in that mine, not one escaping to tell the story, from personal experience, of this great and hitherto unexampled disaster; one of a kind, that, so far as we know, never before happened in the history of mining operations in the coal beds of the Carboniferous series in Virginia and West Virginia.

We visited the scene of this explosion on the 17th and 18th of the month, as soon after it as we could reach Pocahontas, where every possible facility was furnished us by the officers of the company for obtaining information concerning the condition of the mine and of the conduct of mining operations therein when this explosion took place, placing at our disposal the working maps of the mine, completed to the time of the accident, and the regulations in force at the mines, leaving us free to investigate this great calamity as fully as we might desire,—it being the wish of those in authority to have the fullest and widest publicity given to the facts of the circumstances attending this sweeping calamity that instantly deprived so many human beings of life and blighted (temporarily it is true) the fair prospects of a mining company just as it was entering upon a career of prosperity after the large expenditure of money, time and talent necessary for the inauguration of such a great enterprise.

We have had the maps of this mine and its vicinity and that of the mine itself as it was at the time of the explosion, engraved expressly for *The Virginias*; they accompany this issue and explain, more clearly than words possibly can, the facts of the method of working this mine, of the extent of the present workings, of the system of ventilation in operation there, the lay of the No. 3 "big bed" of coal there worked, etc.—Before stating what is known concerning this explosion we will briefly present the facts of the location and condition of these mines and of the coal bed in which they have been driven.

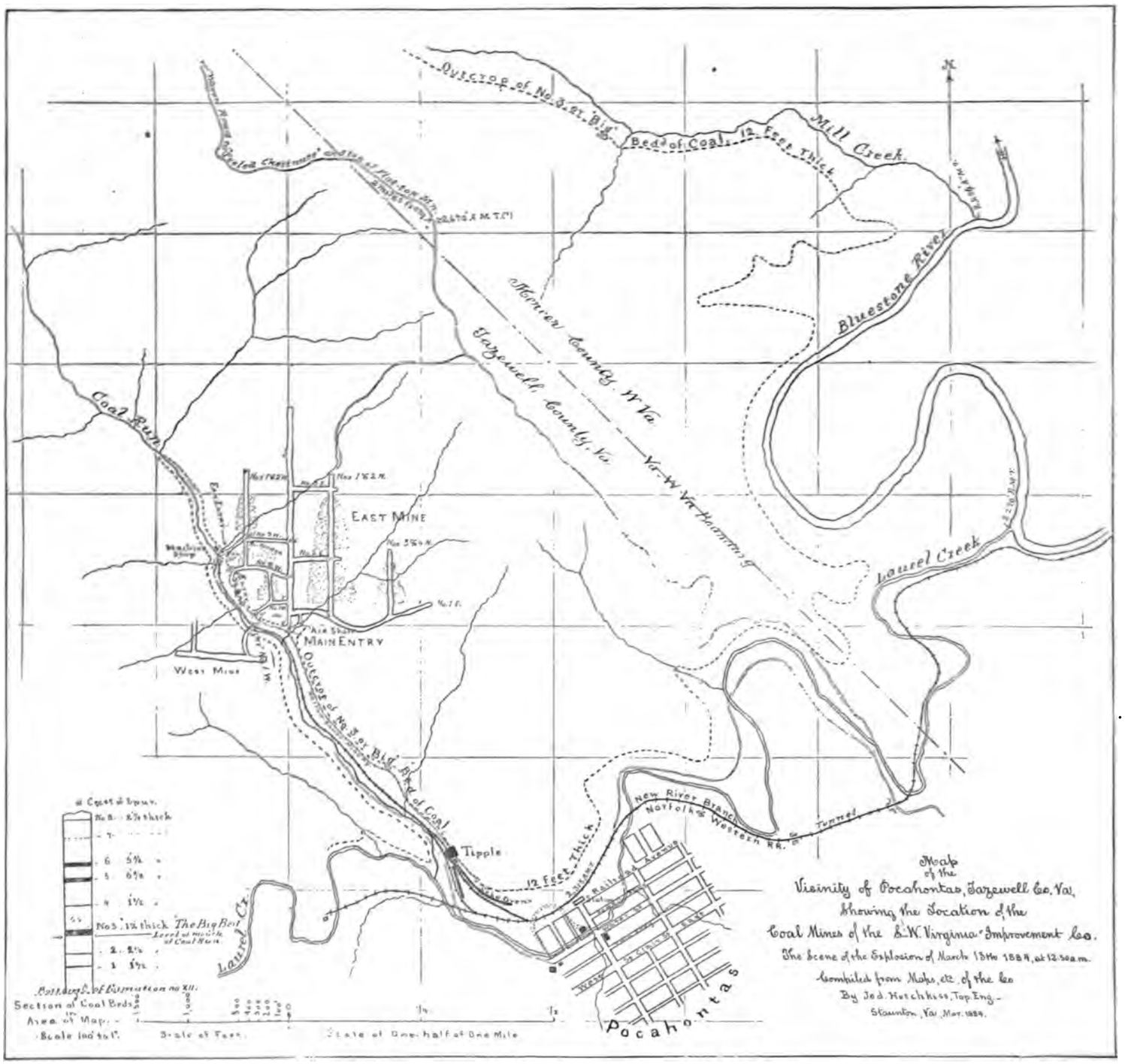
A reference to the map on page 15 of this volume of *The Virginias* will show a branch railway—the New River branch of the Norfolk & Western Railway—terminating in the northern angle of Tazewell county, Virginia; at the end of that branch road is the mining village of Pocahontas, in Virginia, though but a short distance from the line of West Virginia. The map on the next page shows the plan of Pocahontas and the position of that village in reference to the mines of the Southwest Virginia Improvement Company, the Norfolk & Western RR., the state line and Bluestone river and some of its tributaries.

The area shown on the following map is about two and a quarter square miles of the end of a sourtheastward projecting spur of the Flat-top mountain, a spur that is bounded northeast by the deeply trenched, ravine-like valley of Mill creek, southwest by the similar valley of Coal run, and southeast by Laurel creek and Bluestone river, which flow in the same general northeast direction. The mouth of Mill creek is 2,254′ above tide, that of Laurel creek 2,270′, and that of Coal run near 2,315′, making a fall of about 60′ from the mouth of Coal run to that of Mill creek; so the "big" or No. 3 coal bed, the one mined at Pocahontas, that has the bottom of its outcrop but a few feet above the level of the mouth of Coal run, has the same bottom outcroping more than 50′ above the mouth of Mill creek, the coal bed maintaining nearly the same level along its southeastern outcrop while the streams fall to lower levels as they flow to the northeast, trenching more and more deeply into the rock-formations they traverse.

The "Peeled Chestnuts" road, that appears as a light line along the general course of the Va.-W.Va. boundary, starting from the level of Laurel creek, winds up and then runs along very near the crest of this State-line spur. At the point on this road marked by a star, about a mile northwest from Laurel creek, this crest is about 300′ above Laurel creek; so the section of the part of this spur shown on the map would be one of some 300′ above the mouth of Laurel creek. This section is given on the map, showing three fine beds of semi-bituminous coal in the lower portion of this spur. Coal beds Nos. 1 and 2 are below water level at Pocahontas, but No. 3, the "big bed," with its full thickness of twelve feet, and its massive overlying sand-rock, are striking objects in the face of the spur in front of that village. Not far down the Bluestone, beyond the limits of this map, that river reaches the bottom of the Lower Coal Measures, Rogers' No. XII, in which the coal beds here shown are found, and soon trenches deeply into the New River red shales, those of formation No. XI. To the northwest, a few miles distant, this spur and the successively higher and higher ones that, parallel with it, rise on the northeast, run into Flat-top mountain, the eastern escarpment of the Great Carboniferous group, which there contains and exposes more than a thousand feet of the Lower Coal Measures, those which our Pennsylvania geological friends are pleased to call the "Pottsville *conglomerate*," but which here contain a dozen beds of the best semi-bituminous coking coal known, including, besides the 12-feet "big bed," four beds that range in thickness from 4′ 9″ to 6′ 6″.

These Lower Measures coal beds that outcrop above water level in the eastward slopes of Flat-top mountain and its spurs, dip to the northwest and pass through that mountain, coming to day again in its westward slopes and spurs on the waters of the Big Sandy, Guyandot and other rivers of the Ohio. It follows from this that on ascending the streams that flow from Flat-top to Laurel creek and Bluestone river, each of these coal beds will at some point pass under the level of these streams, just as the outcrop of the "big bed is shown on the map approaching Mill creek and crossing Coal run; hence mining operations on the eastern side of Flat-top will at first begin up these lateral creeks, near where the coal beds take cover, and be continued eastward, so as to be level and drainage free; just as the Pocahontas mines are located and worked. So far the operations there have found the "big bed" of uniform thickness, resting on a remarkably uniform floor diping very moderately from 15′ to 20′ to the mile to the northwest. The main entry at the Pocahontas mine was made about a half mile up Coal run; the fan, or fartherest entry, was made three-fourths of a mile up, but still a fourth of a mile below where the big bed takes cover.

The plan of mining operations at Pocahontas is shown on the map on page 47, a photographic reduction of a tracing of the working plan of the mine, on a scale of 50′ to 1′, in the office of the S. W. Virginia Improvement Co., the owner

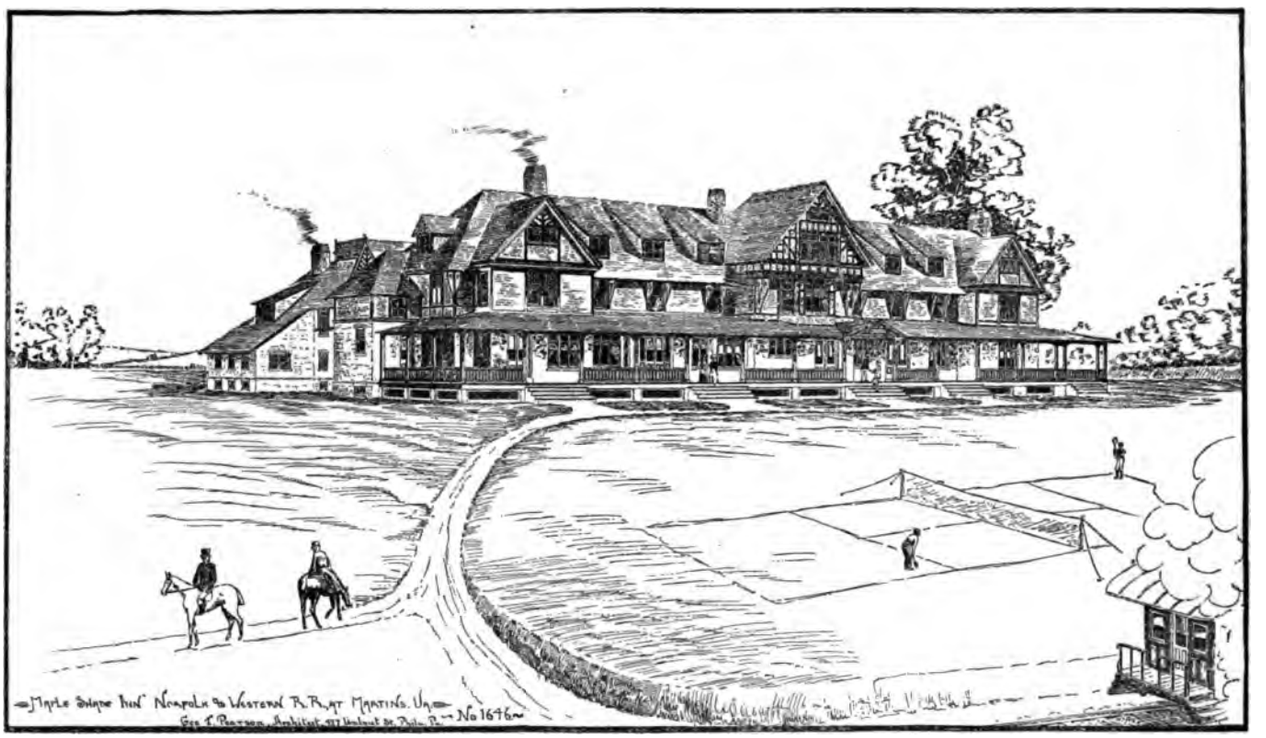


and worker of the mines at Pocohontas; this map is ruled in 500′ squares.

The main entry, with a width of 10′ and a height of 9′ to 12′, (depending on whether the whole bed is cut through or not), commencing on the northeast side of Coal run, ¾ of a mile northwest of Pocahontas, has been entered due north for about 2,300′, most of the way as two parallel drifts, to regulate ventilation, with a wall of coal 25′ wide, cut by cross entries into sections each approximately 100′ long. From the main entry entries are turned to the east—No. 1 at about 150′ from the entrance, No. 2 at about 725′, and No. 3 at about 1,500′, each doubled like the main entry and for the same reason; while to the west are turned entries Nos. 1, 2, and 3. at 280′, 540′ and 925′, respectively, from the entrance.

Parallel to the main entry, about 500′ from it to the east, are entries Nos. 1 and 2 north, extended 1,400′, separated by walls of 25′ of coal up to No. 2 east and of 50′ between Nos. 2 and 3 east, divided into sections by cross entries; from these two north entries working chambers have been mined,

(Continued on page 48.)



Maple Shade Inn, Pulaski, Virginia.

Pulaski is the new name that has been adopted by the authorities of the Norfolk & Western Railroad for the station on their road that has long been known as Martin's, after the not-to-be-recommended Virginia fashion of naming railway stations from the person that happened to own the land where the railway station was established, but which the company purchased for station purposes but kindly allowed the former owner to still call his own, at least in word, by attaching his name in the possessive case to the place.

Pulaski is in the Virginia county of Pulaski—one formed in 1839 and named in honor of the noble Polish count that rendered our country most distinguished service during the Revolution. It is on the Norfolk & Western Railway, 316 miles from Norfolk, the eastern and commercial terminus of that railway, and 92 from Bristol, on the Tennessee line, where that railway joins the East Tennessee, Virginia and Georgia RR. It is 14 miles westward from New River station, where the New River branch of this railway diverges to the Flat-top coal fields 67 miles from that point, and 58 miles west from Roanoke, the junction of the Shenandoah Valley and the Norfolk & Western railways. From it diverges the Cripple Creek branch of the Norfolk & Western RR., some 30 miles long, that is now under construction southwestwardly from that point, to very extensive deposits of superior iron, zinc, and other ores along and near the western base of the Blue Ridge, one often called the Cripple Creek iron region. From the same point a narrow gauge railway, that of the Altoona Coal & Iron Co., extends some 10 miles to the northwest, to one of the best of the deposits of semi-anthracite coals, those of formation No. X, that are found in the North Mountain ranges to the westward of The Valley. The Bertha Zinc Co. has its furnaces at Pulaski and its ores, now hauled some 14 miles in wagons, will soon come to these furnaces over the Cripple Creek railway.

Pulaski is now a railway station village of some 400 people, on the waters of Peaks creek, a bold and ever flowing stream from the North mountains to the westward; soon it will be a city of several thousand inhabitants, for the Pulaski Improvement Company—another of the great development organizations, backed by capital and directed by energy and skill that has been called into being by the wise and prudent management of the Norfolk & Western and the Shenandoah Valley railways—has purchased there more than a thousand acres of Valley land, on each side of and along the railway, which it is now laying out on a scale and plan commensurate with the prospects of a place everyway so favorably located for a large and prosperous manufacturing, trading and residential city.—The zinc furnaces are there now; soon will blast-furnaces, rolling mills, nail-works, and other allied industries gather there, attracted by an abundance of the best of raw materials, cheap and near at hand, and by a country abounding in food and blessed with such a climate as an elevation of over 1900 feet in the latitude of 37° north confers upon a town that looks out upon a wide rolling valley bounded on either side by lofty mountain ranges.

The Maple Shade Inn—a view of which, from the architect's drawings, we give above, is the first building the Pulaski Improvement Co. has contracted to have erected; for it recognizes the fact that most men take but little stock in a place that does not afford them a comfortable and well kept inn.—This fine and commodious hotel, one that in many important particulars will surpass the excelent and widely appreciated "Hotel Roanoke" and "Luray Inn" that add to the attractions of this same line of railways, is now in course of construction by John P. Pettyjohn & Co., of Lynchburg, Va , from the plans of George T. Pearson, of Philad'a, Pa.,under the superintendence of F. P. Summers. It will cost, when completed and furnished, between $60,000 and $70,000. Its site is a very pleasant one alongside a fine grove of sugar maples, which suggested the name selected for this hotel. Its foundation and lower story will be made of a fine sandstone, having an agreeable greenish tinge, from the immediate vicinity.—Of Pulaski and its growth and prospects we shall have more to say hereafter.

Traffic of the Shenandoah Valley RR. in 1883.

We are indebted to Auditor of Receipts, Jos. W. Coxe, of the S. V. RR. for the data from which we have compiled the following statements of the shipments of products of the forests, the stock-farms, the mines, and the furnaces and forges, over the Shenandoah Valley Railway during the calendar year 1883. The returns of the schedules are divided into two classes, north-bound and south-bound, as the general direction of this railway is in a northerly-southerly direction. Cattle and other live stock are reported in car-loads, lumber, ores, and metals in 2,000-pounds tons.

1st. Products of the Forests.

The total movement for the year, by articles and tons, was as follows:

Lumber	26,404	Railway ties	8,480
Bark	8,681	Rough spokes	5,496
Cord-wood	2,886		
Total			59,947

The shipment of all these articles continued quite uniformly during the year, but the movement of lumber was largest in February, May and June; that of bark in June, July and August; that of cord-wood in February, March, and April; that of railway ties in March, June, and November; and that of rough spokes in February, March, August and September.

2. Products of Live Stock Farms.

The total movement of live stock of all kinds, during the year, in car-loads, was as follows:

Cattle	1,590	Hogs	72
Horses and mules	194	Sheep and lambs	382
Total car-loads			2,238

Shipments of cattle were made in each month of the year, but the most of them were sent off in the 5 months from August to December. The largest movement was in October, 526 car-loads, and the smallest in April, 6 car-loads. The shipments, by months, decreased from January to April; then increased to October when a decrease began again.

Horses and mules were shiped in each month, but the shipments of August, September and October were the largest; they were least in February.—Hogs were shiped in all the months but June and August, but more than half of all the shipments were made in October, November and December. There were no shipments of sheep and lambs in March; in April 5 car loads were sent and then there was a steady increase, 26 car-loads in April, 60 in May, 87 in June, to August when 112 were sent, then a steady decrease occured to the end of the year.

3. Products of Mines, Furnaces and Forges.

The shipments of ores, minerals and metals, by kinds and tons, during the year, were as follows:

Manganese	5,386	Iron ore	60,301
Lime and cement	7,866	Pig iron	28,969
Ochre	566	Blooms	834
Zinc ore	102	Railway iron	6,199
Total movement			110,223

The shipments of manganese ore were well distributed through the months, but the smallest shipments were in January and the largest in December.—Lime and cement were shiped with great regularity, but the largest movement was in April and the least in January.—Ochre was freighted regularly, but least in January and most in December.—The shipments of zinc ore were confined to May, June, July and August.—The movement of iron ore was well maintained during each month; the smallest shipments were in January, 2,564 tons, and the largest in May, 9,411 tons.—Shipments of pig iron were made each month, the smallest, 179 tons, in February, and the largest, 4,444, in November. June to December, inclusive, were the most active months.—Blooms were shiped in each month except October and December; the heaviest shipments were in May —Railway iron was moved each month, but the May movement was the largest and the February one the smallest.

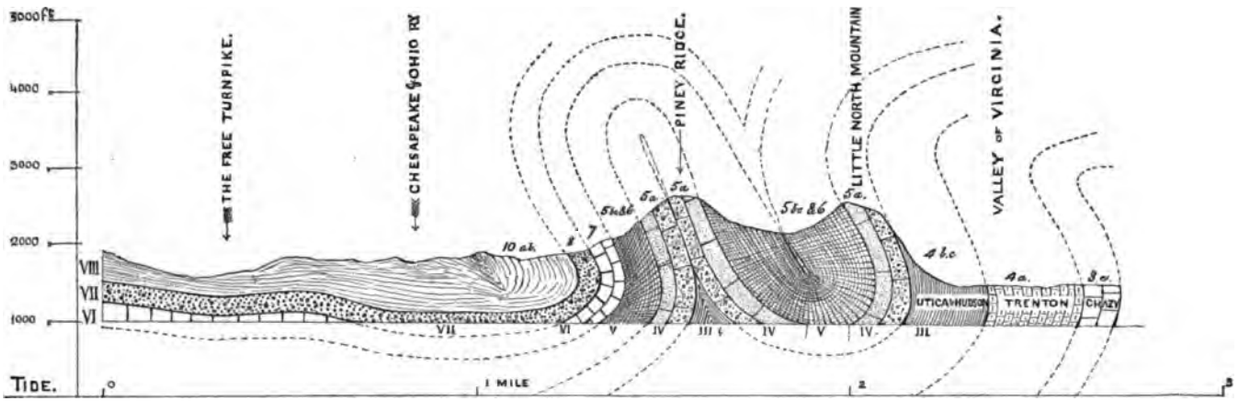
Bee-keeping in Virginia.—We have an interesting letter from Mr. J. E. Pitman, of Marlboro, Frederick county, Va., on the subject of bee-keeping, from which the following extracts are taken. Mr. P. is himself one of the most successful of our apiarist, and we regret that he has not told us more of his own experience in this business, for such it should be in the Virginias.

"I suppose there are from 8,000 to 10,000 colonies of bees in this county (Frederick), but from 70 to 80 per cent of these are in old boxes, or in so-called improved hives, and although they produce some wax and a little honey, in various shapes, for home consumption, they are neglected and therefore unprofitable. There are about 1,000 colonies in this county under modern management of one kind or another. I estimate that these produced in 1883 about 120,000 pounds; I estimate that four apiaries, with something less than 500 colonies of bees, produced two-thirds of this amount. These productive colonies are mainly of Italian or hybrid bees that are worked for honey in the single comb. This estimate of production is for not more than half an average crop, for the weather was cool, cloudy, windy, or wet up to about July 10th, or even later, and the same conditions prevailed in the fall and prevented a yield of honey from the aster blooms.

Bee-keeping is, at best, but a side business in Frederick county, though I think it will, in the future, become a specialty with myself and some others. In Clarke county this business is rather more advanced. I believe there are two or three apiaries in Warren county and the same number in Shenandoah that deserve the name, but as a rule bee-keeping is neglected in those counties and also in Page. There are two apiaries in Winchester of about 140 colonies each; Mr. Deahl, near Berryville, Clarke county, has some 200 colonies.

I feel sure that the possibilities of bee-keeping, even in our part of The Valley, are far beyond the result realized by any one up to this time. I have been anxious to ascertain if there are any better localities than ours in Virginia for this business. I am greatly indebted to Hotchkiss' Summary of Virginia, 1876, for information on this point that I could obtain from no other source. I now know, from that work, what counties to visit for further information.

The following item from the "American Bee Journal," will show you what it is possible to accomplish by skilled bee-keeping in a good locality."—Mr. P. D. Jones, near Mt. Morris, N. Y., from 90 colonies, spring count, during the past season, obtained some 12,000 lbs. of comb honey. Were it necessary, I could give several other reports which have come under my observation, as within what we term our 'bee circle' embraced in the counties of Wyoming and Livingston where there was last year produced a crop of some 100,000 lbs. of section comb honey. This large amount was produced by a limited number of apiarists who mostly make a specialty of the business."



SECTION across LITTLE NORTH MOUNTAIN and PINEY RIDGE N.E. of FERROL FURNACE AUGUSTA Co VA constructed by Prof. J. L. CAMPBELL.
— to be regarded as hypothetical from present data. —

The Geological Section of Little North Mountain, by Prof. John L. Campbell, of Washington & Lee University, Lexington, Va., that we present above, is one of great interest, both from an economic as well as geologic standpoint, as it is the section of the Little North mountain in a line, crossing it at right angles, between Variety Springs and Ferrol stations of Chesapeake & Ohio Ry., Augusta county, Va., in which is located the great deposit of iron ore that is such a prominent and striking object, near the crest of Piney ridge to the eastward of the railway, to the passing traveler from either direction.

Concerning this section—for the admirable drawing of which we are indebted to the artistic talent of Mr. Gilbert R. Frith, of Richmond, Va., which enabled Messrs. Crosscup & West, engravers, of Philadelphia, Pa., to give us a fine relief plate—Prof. Campbell writes us:

"Several years ago I was requested by Prof. Egleston, of Columbia College, N.Y.. and Maj. Jed. Hotchkiss, of Staunton, Va., to co-operate with them in solving the problem of the geological structure of the Ferrol Iron property in Augusta county, Va. The section given above is designed to illustrate my theory of the general geological structure of that portion of the North Mountain range.

It will be seen that North mountain and Piney ridge are both inverted towards the northwest. Such is the case with the whole range through Rockingham and Augusta counties, and as far as Jump mountain in Rockbridge county, where the strata resume and retain their normal dip towards the northwest for many miles.

The section cuts all of the geological formations from the Valley limestones—Lower Silurian, the Chazy and Trenton of the section, Rogers' No. II, up to the Devonian shales, marked VIII. The Roman numbers along the bottom and on the left of the section represent Prof. Wm. B. Rogers' old Virginia notation; while the arithmetical numbers with letters, as 3 c., 4 a. b. c, etc., represent the more general system of notation now in common use.

The only doubt I have about the general accuracy of the section is, as to the occurence of formation "6" between the ridges, the Little North Mountain and Piney ridge."

We may add, by way of explanation, that II should have been placed under the Trenton and Chazy formations on the right of the section, as they belong to the Virginia formation No. II; also that the right hand end of the section is S.E. and the left hand N. W.; also that Nos. III, V, and VII are the iron ore bearing formations of this region, that VI is the Lower Helderberg limestone, used for fluxing by all the furnaces along the C. & O. Ry., except Quinnimont: and that No. VIII is the aluminous shales formation of our Devonian valleys to which attention is called elsewhere in this issue.

This section shows how admirably the great stratified iron ore beds of No. VII, the Oriskany, are here placed and disposed for mining operations; the same beds, similarly disposed, but diping eastward or westward according to the direction of the slope of the mountain where they are worked, are the great iron ore deposits of the Esteline, Preston and Wilson, Victoria, Guy Run, Longdale, Low Moor, Roaring Run, Pounding Mill Run, Stack, and other iron ore estates in the same iron ore belt farther to the southwest along the Chesapeake & Ohio.

In a recent letter Prof. Campbell says: "You doubtless remember that 4c., (III Rogers) rises to the very crest of North Mountain at Pond gap and carries a heavy bed of limonite ore; while at the point where the section crosses it reaches the crest, but no ore is exposed; hence if you can have the 4c. extended a little higher on the ridge, in the cut, it would add to the completeness of the picture."—It was too late to have this change made; the reader can imagine the ore-bearing shales of III carried higher up the eastward slope of Little North Mountain, according to this suggestion.

Waynesboro Junction, the crossing place of the Chesapeake & Ohio and the Shenandoah Valley railways, across South river of the Shenandoah, and nearly a mile eastward from the village of Waynesboro, is daily growing in importance as the exchange of passengers and freight by the two great railways that intersect there is constantly increasing. The C. & O. has now opened a ticket office there in charge of Mr. R. M. Hicks, the genial and accommodating proprietor of the well kept eating house at that point. All the passenger trains of both railways now stop there, greatly to the convenience of the traveling public.

It is unfortunate that this point has been named Waynesboro Junction. It should have a name of its own, as it is sure to grow into a town of importance, one that in time will become an iron or steel manufacturing center, for either of which it has great advantages.

The Holston Co. and the Virginia Iron Co. held their annual meetings in Alexandria, Va., on the 20th of Feb., 1884, and re-elected their directors and other officers to maintain the official status of these companies under the laws of Virginia.

The Tin Ore of Virginia.

On pages 150 and 151 of *The Virginias* for 1883 we published quite full accounts of the discovery of tin ore (cassiterite or binoxide of tin) on the western slope of the Blue Ridge, but near its crest, on the waters of Irish creek of South river of the James, in Rockbridge county, Va., near the line of the Shenandoah Valley RR. These accounts were by Mr. A. S. McCreath of the Pa. geological survey and Mr. Harry D. Campbell of Washington & Lee University, both of these gentlemen having visited the localities where the tin ore had been exposed at that time, Oct., 1883, and made analyses of it.

In "The Advance," of Lynchburg, Va., under date of Amherst C. H., Jan. 22, 1884, we find the following letter from Mr. Edgar Whitehead, addressed to the "American Artizan" of Chicago. This letter repeats the history of the discovery of this tin ore and tells what is known of it at the begining of this spring, when the work of exploring has been resumed.

"In compliance with your request I send you an account of the tin found in Rockbridge county, Va. In the month of September, 1882, Mrs. Martha D. Cash, of Irish creek, in the northeast part of the connty, discovered a deposit of mineral, which she found on her land, and showed it to Mr. Thomas Massie, of Nelson county, a prospector for minerals and the associate owner of this property, with Capt. James W. Henly, of Amherst county and myself. He pronounced it to be the oxide of tin, but did not exhibit the specimens to be tested until June, 1883, when the writer and Capt. Henly showed them to Prof. Dewey, of the Smithsonian Institution, when the American Institute of Mining Engineers visited Lynchburg, Va., and also to Prof. James. P. Kimball. of Lehigh, Pa., both of whom pronounced them to be the best cassiterite, but they were doubtful of the quantity.

We commenced the work of development, by cross cuts, in September, 1883, and at cut No. 1 found a large deposit of ore, (see McCreath's report and Campbell's also) which now appears as stock-werke. This has been opened by a cut 60 feet long and 8 feet deep, and by two cuts, 29 and 39 feet respectively, at right angles to it. At No. 2, 700 yards 25° west of south, we have opened a cut and found a deposit showing about 3 feet of good ore in a vertical vein. The interval between these two points has been cross cut to show the continuity of the vein. There are now to be seen four distinct parallel veins, and a fifth appears by surface indications sufficiently plain to warrant me in saying it is as good as the others, and that it will be opened about the 1st of March next. The altitude of this locality, 2,700 feet above the tide, makes it impossible in the severe weather we have had this winter, to do any work and the ground is now covered with snow. Our purpose is now, as soon as the winter breaks, to demonstrate, by actual mining, that there is sufficient ore to justify the erection of works for the concentration and smelting of the ore on the ground.

The quality of this tin ore, its freedom from deleterious matter and the continuity of the leads, being now a settled question, it only remains to settle the question of quantity to enable us to say that there will in a few years be no necessity for the United States to import $25,000,000 worth of tin and tin plates from England, as they did in 1882, and which paid a duty of 45 per cent on about $19,000,000 of it, if not more. There is here an area of 5,000 to 6,000 acres in which the surface indications justify me in believing that tin is to be found, and I have no doubt but that it will be found during the year 1884, at other places in Virginia, on the line southwest of this locality. We have several thousand acres of this land under contract, but I am writing particularly now of the 'Martha Cash Mine' at which sufficient work has been done to justify the assertion that we have in Virginia a veritable tin mine, in which ore occurs over a tract of 150 to 400 acres of land. A favored locality and perhaps better than others because found first, and first because of a larger outcrop here than at other places, and at which mining above water level can be carried on for 250 feet. There is a fall in Irish Creek at this place by which the water can be utilized for the cleaning of the ore for market, and for hoisting the ores from the mines, and for years without the use of steam. The property is nine miles from Vesuvius, a little village and station on the Shenandoah Valley RR. A branch road down the valley of Irish creek to its mouth at South river would intersect the S. V. RR. at a distance of 12 or 13 miles with comparatively little cost.

Analyses of these tin ores and the accompanying mispickel have been made as follows :

1. By A. S. McCreath, chemist of Second geol. survey of Pa., Oct. 15, 1883, who obtained an average of 31.60 per cent of metalic tin from the vein matter analyzed, and reported that 70 per cent or more could be realized from selected ore. From a sample of the associated mispickel he obtained $43.70 of silver and $2.06 of gold to the ton.

2. By Harry D. Campbell, assistant professor of geology and chemistry, Washington & Lee University, Oct. 23, 1883, obtained 63.583 per cent of metalic tin from a sample he selected.

3. B. Silliman, professor in Yale College, obtained 68 per cent metalic tin from ore sent him, and $60 worth of gold and silver to the ton of mispickel.

4. Ledoux & Ricketts, chemists, of New York, found 5.5 ounces of gold to the ton of mispickel, for W. D. Hills, of Cleveland, Ohio.

5. Cabell Whitehead, at Lehigh University, Bethlehem, Pa., obtained 64.62 per cent of metalic tin from samples he analyzed, and an average of 38.24 from three samples from the dump.

6. Frank A. Massie, of University of Va., assayed 73.73 ounces of silver and 7.36 ounces of gold to the ton of mispickel, a value of about $255 per ton.

7. Dr. Henry Frœhling, of Richmond, Va., obtained 29.225 per cent of metalic tin from sample of ore and gangue assayed by him for R. Boyns.

Tin in West Va.—R. A. Robbins, from Milton, W. Va., under date of Feb. 18, 1884, writes as follows to the "Advertiser" of Huntington, W. Va.:—Under the heading of "Southern news gleanings," in your paper of February 9th, my attention was called to the following statement: "The discovery of tin at King's mountain, Cleveland county, N. C., is announced. This is the first discovery of this metal in the United States. The state chemist will make a careful examination."

On the 20th of Sepr., 1879, I discovered red tin in Mason county, W. Va.; tin stone enough to last a dozen furnaces 500 years, runing night and day. We have formed a company with $3,000,000 capital, and we blasted out last September 20 tons of the tin stone and have roasted part ready to be assayed in your city as soon as the weather will permit of transportation.

The Congressional Districts of West Virginia.

On the same map* that we show the congressional districts of Virginia, as recently established, we also show the four congressional districts into which West Virginia is now divided. Below are tables giving the counties in these districts and their population, by race, in 1880.

No. 1.—The First District.

Counties.	Whites.	Blacks.	Totals.
Hancock	4,854	24	4,878
Brooke	5,928	85	6,013
Ohio	36,577	870	37,447
Marshall	18,607	223	18,830
Wetzel	13,874	22	13,896
Tyler	11,067	6	11,073
Doddridge	10,498	54	10,552
Harrison	19,292	889	19,181
Lewis	12,943	323	13,266
Gilmer	7,061	47	7,108
Braxton	9,683	104	9,787
Totals	151,384	2,647	153,031

No. 2—The Second District.

Counties.	Whites.	Blacks.	Totals.
Monongalia	14,668	317	14,985
Marion	17,043	155	17,198
Preston	18,885	206	19,091
Taylor	11,056	399	11,455
Barbour	11,413	457	11,870
Tucker	3,125	26	3,151
Randolph	7,990	112	8,102
Grant	5,038	503	5,541
Hardy	6,042	752	6,794
Pendleton	7,923	99	8,022
Mineral	8,141	489	8,630
Hampshire	9,714	652	10,366
Morgan	5,580	197	5,777
Berkeley	15,452	1,928	17,380
Jefferson	10,958	4,045	15,003
Totals	153,028	10,237	163,365

No. 3.—The Third District.

Counties.	Whites.	Blacks.	Totals.
Upshur	10,048	201	10,249
Webster	3,205	2	3,207
Pocahontas	5,257	334	5,591
Nicholas	7,165	58	7,223
Greenbrier	13 078	1,981	15,059
Fayette	10,438	1,122	11,560
Summers	8,262	771	9,033
Monroe	10,372	1,129	11,501
Raleigh	7,296	71	7,367
Wyoming	4,258	64	4,322
Mercer	7,101	366	7,467
McDowell	3,071	3	3,074
Logan	7,220	109	7,329
Boone	5,635	189	5,824
Kanawha	29,596	2,870	32,466
Clay	3,460	0	3,460
Totals	135,462	9,270	144,732

No. 4.—The Fourth District.

Counties.	Whites.	Blacks.	Totals.
Pleasants	6,230	26	6,256
Ritchie	13,410	64	13,474
Wood	24,081	925	25,006
Wirt	7,091	13	7,104
Calhoun	5,998	74	6,072
Jackson	16,209	103	16,312
Roane	12,145	39	12,184
Mason	21,431	859	22,290
Putnam	11,020	355	11,375
Cabell	12,842	902	13,744
Lincoln	8,687	52	8,739
Wayne	14,519	220	14,739
Totals	153,663	3,632	157,295

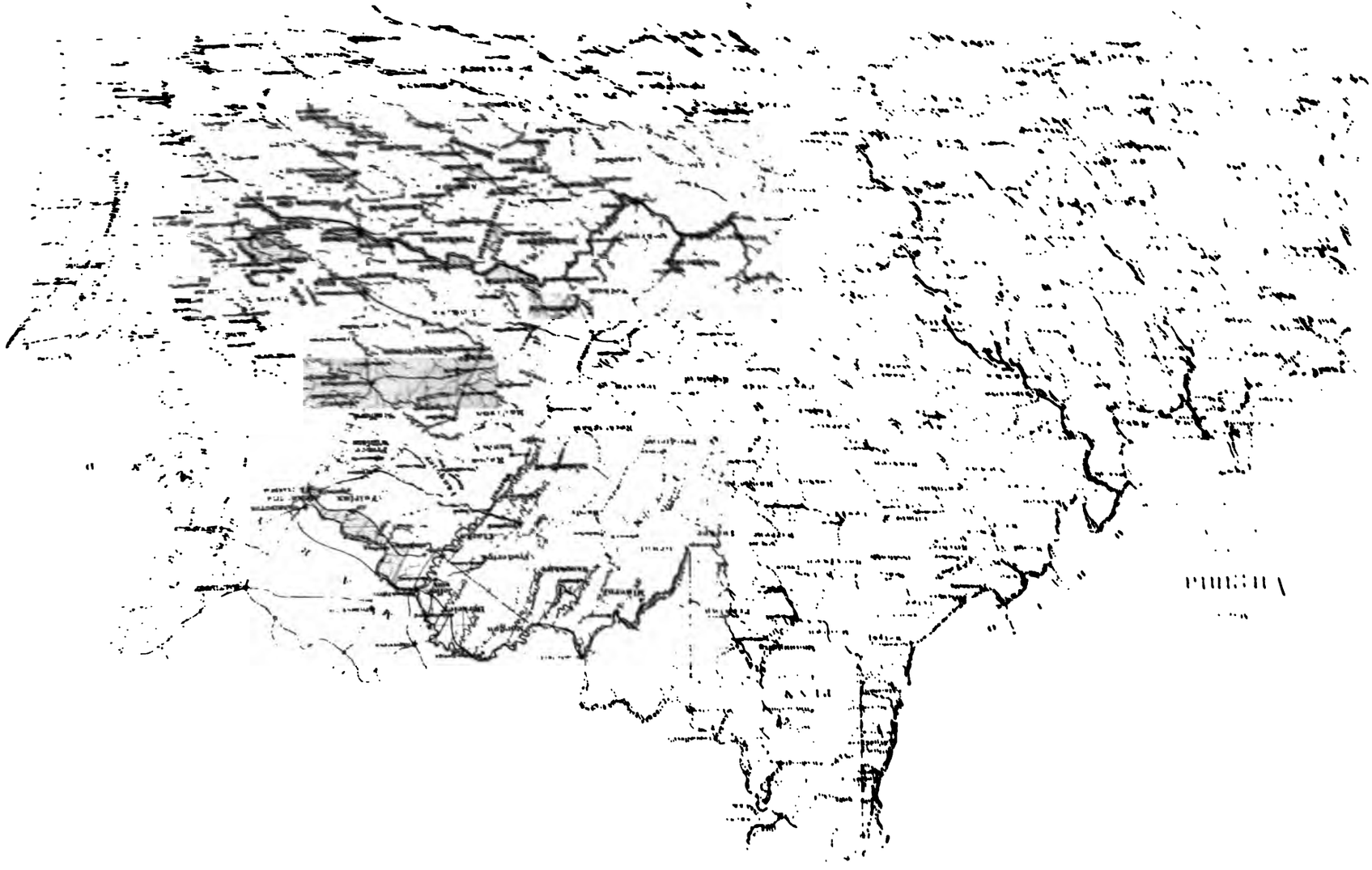
*See Map No. 5 on page 18 of Feb., 1884 No. of *The Virginias.*

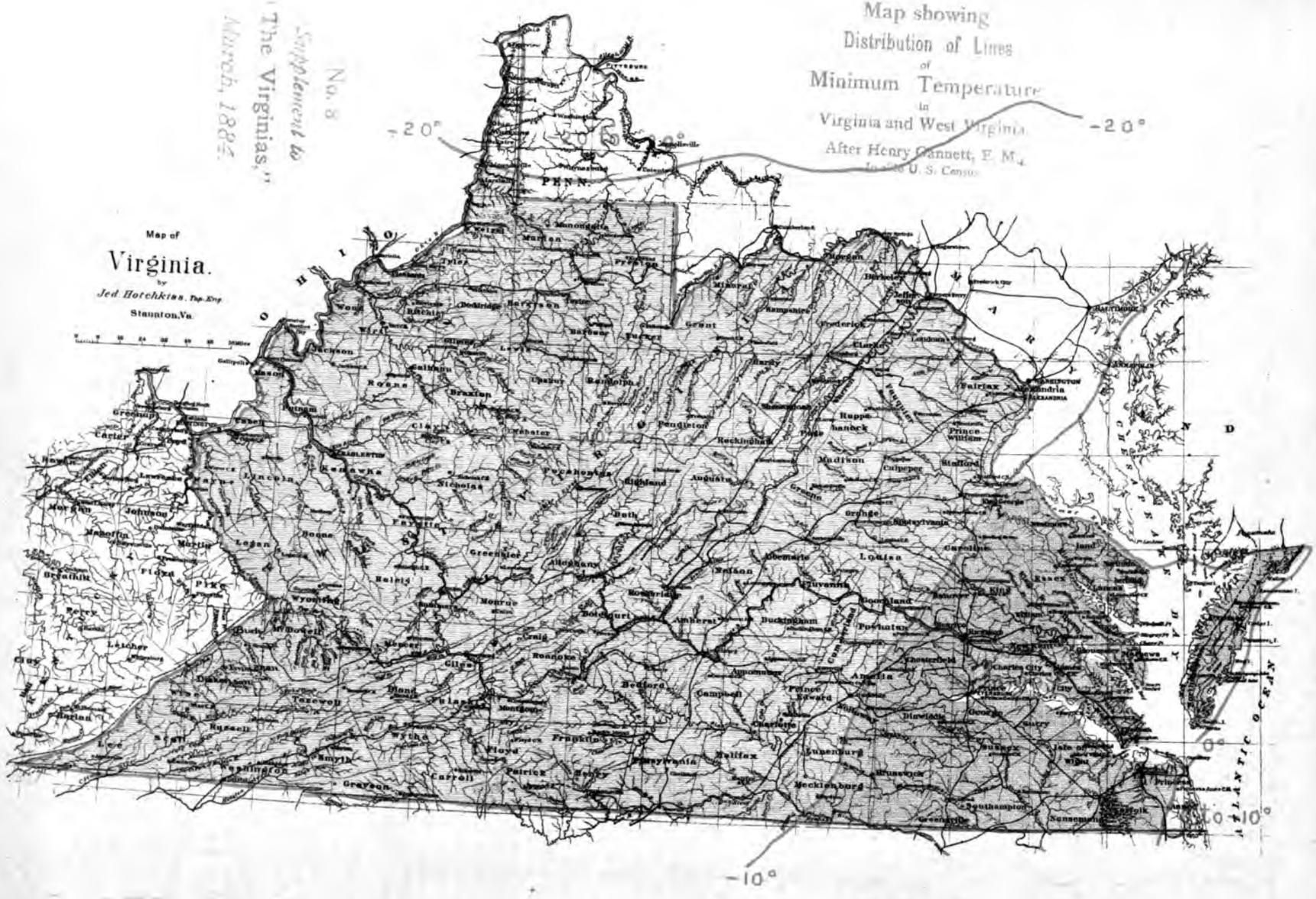
Virginia Beach, on the sea shore south of Cape Henry, Princess Anne county, Va., some 9 miles from Norfolk, by an air-line railway, bids fair to become one of the noted seaside resorts of the country; large hotels, pavillions, and other structures such as make similar places attractive, are now being completed and everything will soon be in order for the reception of guests. A late number of the Norfolk "Virginian" says of the place:—

Norfolk enjoys many privileges in summer, but we have known nothing equal to the delightful advantages of Virginia Beach as a summer resort. Under the arrangements for next summer our people may spend their evenings on the shores of the ocean and sleep at home. It will be no small privilege to get a whiff of ocean breeze every day after business has closed.

But other advantages will Norfolk derive from this new enterprise. There is no doubt that it will soon become a popular resort for people in search of health and pleasure. It is the only ocean resort of any note on the South Atlantic coast It is in sight of one of the life-saving stations. The driving is excelent, and the fishing in Linkhorn bay can't be beaten. The bathing and breeze are as good as the ocean can give, and all the natural advantages possible are there. Thousands of rich people will visit the Beach during the year, and all of them must pass through Norfolk. It will bring men of capital to our city, and they will see what fine investments may be had here, and the Beach is so near that visitors will do much shoping here, and the hotel will need large quantities of supplies for its numerous guests. Accommodations for more than a hundred guests at a time can be given next summer, and the company are prepared to spend ten times as much money as they have already invested there, if the patronage shall justify it. Surely, then, it is an enterprise in which our people are materially interested, and it will certainly receive every encouragement we can give it.

Alum clay deposits are asked for by Mr. John Ott, of Richmond, Va., that he may inform a correspondent where such may be found in Virginia. We have replied that all of the Devonian, or No. VIII, valleys of the Virginias—those colored light brown on the Rogers geological map that we have published—are full of beds of alum shales rich in materials for the manufacture of alum, etc. The Chesapeake & Ohio Ry. traverses a number of such valleys, in fact its track is on these shales nearly all the way from Buffalo Gap to the White Sulphur Springs, a distance of 78 miles.




Map showing
Distribution of Lines
of
Minimum Temperature
in
Virginia and West Virginia
After Henry Gannett, E. M.,
In the U. S. Census
Map of
Virginia.
by
Jed Hotchkiss, Top. Eng.
Staunton, Va.
No. 8
Supplement to
"The Virginias,"
March, 1882.
-20°
-20°
-10°
-10°
0°
PENN.
OHIO
MARYLAND
ATLANTIC OCEAN

The Climatic Temperatures of the Virginias.

(Continued from page 14)

Illustrated by Maps No. 7 and 8.

Continuing the article on the Climatic temperatures of Virginia and West Virginia, based mainly on the census report of 1880, that was begun in the January, 1884, No. of *The Virginias*, we now proceed to consider the lines and areas of maximum and minimum temperatures in these states.

Map No 7, on page 40, shows the lines and areas of *Maximum Temperature* in the Virginias adapted from map No. 23 of Vol. 1 of the U. S. census of 1880, by Henry Gannett E. M., that shows the distribution of lines and areas of maximum temperature in the U. S. Seven zones of maximum temperature appear on this map of the United States, as follows: below 90°, from 90° to 95°, from 95° to 100°, from 100° to 105°, from 105° to 110°, from 110° to 115°, and 115° and over. Only two of these zones, according to this map, cross the Virginias; those of 95° to 100°, and of 100° to 105°, proving that their climate is comparatively equable for this continent, which is noted for its extremes of heat and cold.

The zone of 95° to 100° of maximum temperature as represented on the map, includes all of West Virginia and nearly half of Virginia. In Virginia this zone is in two belts, one that includes about half of Tidewater, approximately that part east of the meridian of 76° 30,' the Eastern marine plain, where the maximum heat is tempered by proximity to the oceanic waters of the Atlantic and Chesapeake bay and its great tidal arms, and another that includes most of Piedmont and all of the Blue Ridge, The Valley, Apalachia and Trans-Apalachia, or what,as a whole,may be called the high region of the state, that more than 500 feet above tide-level, the elevation of which tempers the tendency to heat extremes.

In the United States this zone of 95° to 100° of maximum temperature is shown as embracing a belt all around the Gulf and Atlantic coasts, where it is generally narrow, but it projects a wide tongue up the Mississippi to the vicinity of Memphis, covers all the southern half of Florida, the bay regions of North Carolina, Virginia, Maryland, Delaware, New Jersey, and New York, including Long Island, beyond which this line turns southwestward through the Piedmont regions of New York, New Jersey, Pennsylvania, Maryland, Virginia, North Carolina and Georgia into Alabama, where it turns westward to just within Mississippi, then north through Tennessee and Kentucky, northeast through southern Indiana into Ohio, then northward to the west end of lake Erie, west through southern Michigan and across northern Illinois and northeastern Iowa, thence north through Minnesota to British America, including in this zone all the country between these boundary lines. This is the maximum temperature, according to this census map, of the Atlantic highlands region proper, that of the most of the territory of the New England and Middle states, of Ohio, Kentucky, Tennessee and northern Georgia and Alabama, and of most of Michigan,all of Wisconsin, and parts of Iowa, Illinois and Minnesota.

Our criticism of this zone as it appears on our map of the Virginias is that we have large areas within this zone, in Piedmont, Blue Ridge, The Valley, Apalachia and Trans-Apalachia in which the thermometer properly placed never reaches 95°, much less 100°. The scale of the census map is rather too small to show these areas, but they could have been shown as well as that of 90° to 95° in the Blue Ridge (Green mountain) belt of Vermont and New Hampshire. Of these regions we will treat hereafter when we publish a hypsometric map of the Virginias.

The zone of 100° to 105° of maxima is shown on Map No. 7 as including all of Midland, the western half of Tidewater and the easterly portion of Piedmont. This zone is altogether too large, especially is it carried too far to the westward. It is projected from temperature tables made from observations in confined and depressed localities where the maxima are always much higher than in the open and higher country that constitutes the larger portion of the area here colored for this zone. The portions of Virginia where the thermometer ever reaches or passes 100° are very limited in extent; they are limited and confined localities, not large areas.—The trouble about the whole matter is that we have but very few meteorological stations in these states and these are so situated that they furnish the data for but limited portions of our territory, therefore the generalizer of the facts of temperature, unless very familiar with the regions treated of, is easily led into errors.

The zones of 100° to 105° occupy all the U. S. eastward and southward of the eastern boundary given above for the zone of 95° to 100° except the narrow coast belt of 95° to 100°, also mentioned, and all the country west of the named western boundary of 95° to 100° to near the meridian of 95° west. besides parts of Texas, Iowa, Minnesota and Dakota west of that line.

The hot regions of the Union are westward of the meridian of the western lines of Missouri and Kansas where a territory as large as all the country of the U. S. east of the Mississippi is embraced in a zone of 105° to 110° of maximum temperature (which there does not mean a few hours of such maxima at intervals, but days, weeks, and even months of such high temperatures), including half of Texas, all the Indian Territory, New Mexico, Kansas, Nebraska, half of Dakota, and much of the region beyond these to the Pacific. The same region includes zones of large areas having maximum temperatures of 110° to 115° and over 115°.—The regions of "blizzards" and "northers" are also the regions of "hot-blasts," for "extremes meet" in climatic as well as in other things.

A table (No. XXXVI) of the Census report illustrating the distribution of population in the U. S. in accordance with population, shows that in 1870 and also in 1880 fifty-two per cent of the population of the Union (over 20 millions in the former year and over 26-millions in the latter) lived in the zones of 95° to 100° of maximum temperature,—those of all of W. Va. and the larger part of Va.—and that 41 per cent of the population (about 16-millions in 1870 and 20-millions in 1880) lived in the zones of 100° to 105°, those of the remainder of Virginia. In other words, 93 per cent of the people of this country, following their own inclinations, have settled in the two zones of maximum temperature in which the territory of the Virginias is included.

About 63 per cent of the foreign and 29 per cent of the colored population of the U. S. live in the zones of 95° to 100°; and about 29 per cent of the foreign and 68 per cent of the colored population live in the zones of 100° to 105° of maximum temperature; and 97 per cent of all the colored population of the country lives in the two zones in which the Virginias are placed.

Commenting on this table the Census report (page LX) says:—"This classification shows a great degree of uniformity in the humid region of the country. In this section a higher temperature than 105° is practically unknown, while the portions in which the maximum temperature never rises above 95° are very limited and contain a very light population, being confined almost entirely to the mountain regions of the Apalachian system. No less than 93 per cent of the population are found in the classes which have a maximum temperature between 95° and 105°.

The whole Atlantic coast from Penobscot bay to the

mouth of the Rio Grande, and the whole coast of the great lakes besides a considerable portion of the Pacific coast, are found in the class of 95° to 100°, while classes 100° to 105° comprise the the Atlantic plain, stretching from the eastern base of the Apalachian system to the neighborhood of the coast, and nearly all of the Mississippi valley. As we approach the plains, whether in the northern or the southern parts of the country, the maximum temperature increases, so that the line of 105° maximum temperature is not very far removed from a north and south line."

Map No. 8 shows the distribution of lines and areas of *Minimum temperature* in the Virginias, based on Map No. 24 of the Census report, on which map of the U. S. 10 zones of minimum temperature are shown, ranging from below -50° to 30° and over, each differing from the other by 10°,—the minima of represented temperatures in the U. S. ranging from 30° above to 50° below zero. These zones for all the country east of the Rocky mountains lie in easterly and westerly belts that turn northward on the Atlantic coast, unlike those of maximum temperatures which trend northerly and southerly.

Only four of these zones cross the Virginias; those of 10° to 0°, of 0° to -10°, of -10° to -20°, and of -20° to -30°. Practically there are but two of these zones in these states, for only a scrap of Virginia, the uncolored area in its southeast corner, is in the zone where the lowest observed temperatures are from 0°, or zero, to 10° above; and only part of the "pan-handle" of W. Va., the part north of Moundsville, also uncolored, is in the zone of 20° to 30° below zero; so we may say that nearly all of West Virginia and some two-thirds of Virginia, are embraced in the zone in which the lowest observed temperatures are from 10° to 20° below zero. The remainder of Virginia, all of Tidewater except the corner above mentioned, the narrow belt of that grand division along the Potomac above Mathias point, and the southeastern part of Midland are in the zone in which the observed minimum temperatures are from 0°, or zero to 10° below zero.

We comment upon these map generalizations of minimum temperatures as we do above on those of maximum temperatures, that wrong conclusions may not be reached concerning our climate by those not familiar with the topographical condition of these states. The extremes of the map are only reached at some elevated localities and there only at intervals. For example, Lynchburg, Va. is located in the zone of 10° to 20° *below* zero, and yet on refering to the reliable weather tables of the Signal Service reports we find that the temperature there was not even down to zero in 1874, 1875, 1876, 1878 or 1880; that it it was 4° below once in 1877 and 5° and 3° below on two occasions in 1881.—These are the only reports we have at hand. The colorings of the maps are those of rare and exceptional low temperatures, not those of the normal conditions of our winter weather.

In Census volume I. a table. No. 37, is given that "shows the distribution of population in accordance with the lowest observed temperature. In this class 18 groups are indicated, ranging from 55° below zero up to 30° above, with an extreme range of more than 85°. The great bulk of the population lies between 35° below zero and 10° above a range of 45°, within which limits are found 95 per cent of the population. The smaller groups outside of this body are confined almost entirely to the Cordilleran region and to the Pacific coast."

"The foreign element is found in excess of its general proportion from the lowest grade up to 20° below zero. From that point to 15° above zero it is below the average, rising above it through the remainder of the table, owing to the large proportion of foreign population in the southwestern territories, where the greatest extremes of temperature are found. The colored population is below, in some cases far below, its general proportion up to 10° below zero; from that point to 20° above zero it is in excess, falling off rapidly beyond that point."

"In this table, showing the distribution of the foreign and colored elements in accordance with the highest observed readings of the thermometer, the sharp line of demarkation between the foreign and colored elements appears to cease entirely. A reference to the map, however, shows at once the reason of this. The maximum temperature is dependent but little upon latitude, but is controled, as was stated above, almost entirely by the relative moisture of the atmosphere, and consequently its lines in this country follow meridians more nearly than they do parallels. Nearly two-thirds of the foreign population are found in grade 95° to 100°, while of the colored nearly 97 per cent reside in that and succeeding grades. In the first of the above classes the foreign population is in excess of the normal ratio, and in the latter below it. With the colored the case is reversed. The class 100° to 105° comprises two-thirds of the colored population, more than 96 per cent being found in the two classes 95° to 103°.

Corrections in Fontaine's articles on Blue Ridge plateau.—We overlooked some corrections, sent us, previous to publication, by Prof. W. M. Fontaine, of the University of Virginia, to be made in the very valuable and interesting paper on the "Mineral Resources of the Blue Ridge Plateau" that he recently contributed to *The Virginias*, hence we gladly give place to the following note, sent us under date of March 5, 1884:

"The specimens from Jefferson Peak in the Blue Ridge, sent to me by Dr. Stigleman, and which were mentioned in my article on the Floyd Plateau, on page 11 of the No. of "The Virginias" for Jan, 1884, have been examined in the laboratory of the University of Virginia.

Two selected specimens, composed of quartz and copper pyrites, showed, the one 4½ per cent, and the other 8 per cent of metalic copper. These are no doubt samples of the best ores. It was thought that possibly gold might exist in the ores but none was found.

From a letter received from Dr. Stigleman since the paragraph on the Jefferson Peak copper mine was written, I gather that Dr. S. gave the account sent to me from hearsay. On visiting the locality he found that the indications of a large deposit of copper ore were not so good as he had been let to expect. I make this statement as my expression of favorable opinion was based upon the assumed correctness of Dr. Stigleman's first description.

In my article on the Floyd Plateau, page 10, of the Jan. number of "The Virginias," under the heading "Gossan of the Southern portion of the Great Northern Lead," I am made to say "the mass is sometimes 200 feet wide." The statement should be "100 feet wide."

Catawba iron ores, from the Catawba iron property, Botetourt county, Va., some 8 miles from line of Shenandoah Valley RR., sampled by Mr. E. D. Frazier, one of the best ore prospectors in Virginia, have recently been analyzed Mr. P. G Salom, of Philadelphia, Pa., with the following results:

	No 1	No. 2	No. 3
Metalic iron	42.55	44.68	43 61
Silica	22 44	14.86	18.94
Alumina	3.20	2.71	5.72
Sulphur	0.037	0.043	0.049
Phosphorus	0.41	0.40	0 64

A mixture of the three samples yielded, by separate analysis, 43.71 per cent of metalic iron.

Poor Mountain Iron lands, Roanoke county, Va.

Under date of May 8, 1883, Mr. J. B. Gifford of Philadelphia, Pa., an expert in iron matters, sent the following report on the Poor Mountain iron ores, etc. to Messrs. Rorer and Chapman, of Roanoke, Va.—

I have made a hurried examination of your "Poor Mountain," Roanoke county, Va., iron ore property, which is known as the "Bott survey," containing about twenty-eight hundred acres of land, and embracing the base and northwest side of the mountain from opposite Big Spring and extending eastward for miles along the mountain range, in which there are stratified seams of shale and hematite ores extending through the entire length of the property, aggregating from 50 to 70 feet in thickness and extending down to an unknown depth, which in my opinion is very valuable, not only on account of the millions of tons of ore it contains, but the superior quality of iron that a mixture of these ores will produce. The ore belts are one mile from the Norfolk and Western railroad, and run parallel with the road the entire length of the survey, and have a height, where they crop out, of from 150 to 200 feet above water level. From what I could learn when on the property, the dip of your ores is N. W., or with the mountain, which will enable you to mine at a low cost, having sufficient grade for one-third of a mile to operate a self-acting incline, which will reach a point from where you can build a tramway or narrow gauge road to the Norfolk and Western railroad, the entire distance being about one mile.

At the point where you reach the Norfolk and Western railroad there is a very desirable location for furnaces, having an ample supply of water and an inexhaustible supply of good limestone within a few rods of where furnaces could be built. Therefore having an unlimited quantity of ore that can be mined and delivered at a low cost, which will produce good iron, an inexhaustible supply of good limestone that can be had cheap, and being within easy reach of "Flat-top" West Virginia coal, which produces the best of coke, you could not in my opinion select a more favorable location for the cheap manufacture of good and cheap iron in Southwest Virginia. Should you desire to dispose of the property you will have no difficulty in convincing practical men of the advantages you have over many other localities as to quantity and quality of ores and limestone, and the cheapness of mining and delivery to railroads at the point shown me as a suitable location for furnaces.

By judicious management the cost of producing pig iron from your Bott ores at the point shown me, should not exceed the following:

Cost of shale and hematite ore per ton of pig metal, 2 tons	$1.75
Cost of Flat-top coke per ton of pig metal, 1½ tons	4.50
Cost of limestone per ton of pig metal, 1 ton	.75
Cost of furnace labor and management	2.00
Cost of interest on investment, repairs, &c	1.50
Total cost per ton	$10.50

Mr. Gifford's estimates of cost of raw materials are all above what they will prove to be, for these mines are only about 100 miles from the Flat-top coke ovens and the limestone is alongside the ores.

On page 2 of *The Virginias* for 1883 we published detailed analyses of samples of the Poor Mountain ores by Dr. Hy. Froehling; they contained from 55.140 to 57.54 per cent metalic iron.—The owners of this property are now taking from it and piling up beside the N. & W. Ry. a large quantity of superior ore; the show of ore in the opened mines is a remarkable one.

Mining and Washing Iron Ore.

To open up new work in this section of the state, the Cloverdale iron belt, is to "strip" or remove the soil from the ore face for a distance by an "open cut" runing in the direction of the ore vein. The "striping" often contains enough ore to pay for washing; in such a case it should be removed to a place by itself and when a sufficient quantity has accumulated then be taken to the washer.

After the surface is striped the driving of the cut and the mining the ore begins. Wheelbarrows are first used for a distance of about 100 feet, then a track is laid with 16 pound rails and the regular open cut side and end dump train cars are put on. A very common mistake is to run large 2-ton mine cars into the cut on first level instead of runing on the main train track with the large cars and under a chute which is filled with ore from the dump cars from the open cuts. Another error is in pushing the cut too far in one direction and away from the main loading point or from the entrance of the cut, making a long and expensive haul. This may often be avoided by a side cut and dump with chute for the ore; by this means half of the haul is saved and the waste will not be in the way of future work.

Special attention must be paid to the selection of fine wash ore, seeing that there is not too much sand or clay in it, and that all the lumps of clay or flint are removed. This is easily effected by employing a boy at each car, as it is loaded, to pick such lumps out and when loaded run out to the tipple and dump into a large chute situated at a lower level. The most desirable form of chute is one with a triangular cross section with a door in the side to work by a lever emptying the ore into the regular mine cars on the main line to the washer A good plan is also to have a screen over this chute to screen out all lumps of ore which can afterwards be loaded separately. The cost of mining this fine ore should not exceed 40 cents per ton, and in order to keep the cost within this limit use as few foremen, old men, or boys and as few non-producers as possible. The laborers must be selected in reference to their physical capacity and as soon as the trifling or lazy ones are found out give them the "grand bounce."

Each car must be loaded to its full capacity and its quality frequently examined and checked by its product when washed. The ore should wash not less than 30 per cent and it should be selected, if possible, to wash 50. Ore in washing ought not to lose, on an average, over one half. The washed product ought to have a value of from 40 to 55 per cent metalic iron.

The ore from the mine cars will come on to a platform and thence out to a tipple where it is dumped into another chute holding from 50 to 150 tons of fine ore and similar in construction to the first one described, and then run out into the water rapidly and regularly by a man or boy feeding it.

There should be plenty of water runing into the washer, say from 150 to 200 gallons per minute, the quantity depending on the amount of sand and clay in the ore. The wash ore can pass directly into a car on the railroad, or, better still, be conveyed by a horizontal conveyor to a large chute over the track where the ore can be stacked. By having two or three boys to pick out all lumps of flint, sandstone, and balls of clay as it passes along in the conveyor, the ore can be easily freed from all impurities of any size. The washer should be located as near the ore bank as possible and its site selected with the greatest care so that the natural slope of the ground can be taken advantage of as the force of gravity plays an important part in handling ore economically. A thoroughly competent man ought to be employed to select the site and superintend the erection of the washer plant.

The washed ore should not cost over 5 cents per ton of the product, though many times it has cost in some localities as high as 30 cents per ton. To mine ore at its minimum cost the smallest details should be regarded closely and the slightest unnecessary expense or waste checked as soon as discovered. A thoroughly practical knowledge of the material handled and methods employed, and an experienced manager, are among the first and essential elements of the cost of mining iron ore.

Alfred F. Brainard, M. E.

Houston Mines. Va.,
Feb. 9, 1884.

The South-West Virginia Improvement Co's. Rules for Government of Employees.

Preamble.—All persons employed in or about this Colliery are hereby notified that the following rules and regulations have been adopted for the purpose of preventing injury to persons or property, from negligence or carelessness of the employees.

The attention of each class of workmen is hereby called to the duties assigned them ; they are also requested to do all in their power to avoid all unnecessary risk in following their daily avocations.

Mine Boss.—It shall be the duty of the Mine Boss to direct and generally supervise the whole working of the mine. He shall instruct the workmen in their several duties.

It shall be his special duty to keep the work in proper shape as it advances.

He shall keep a careful watch over the ventilating machinery, air-ways, traveling-ways, pumps, etc., and shall see that the miners timber their places properly as they advance and see that they keep their places free from danger of loose coal, slate, or rock falling.

If he shall find a place in a dangerous condition, it shall be his duty to give orders to have it secured by taking down or proping up the loose material with the least possible delay ; or if necessary, he shall stop all mining in the said place until it is secured.

He, or his assistants, shall go over the mine every evening and see that the doors along the air-passages are properly closed.

Driver Boss.—The Driver Boss shall see that the drivers are at the stables in proper time in the morning, and ready to begin work at the appointed time.

He must see that the mules are regularly fed and watered, and properly attended to, and must see that the mules are not driven up steep grades without frequently resting them.

He must see that the mules are not unnecessarily whiped or abused.

If the safety of persons or animals requires a safety-block or latch to be thrown across the track, he shall see that it is done.

He shall not allow the door-boys to leave their doors except by permission of himself or the mine boss.

Miner.—It shall be the duty of every miner employed in the mines to examine the roof or other overhanging material in his working place as soon as he shall enter the same in the morning, and if found unsafe, he shall immediately take down, or prop up the loose material, and see that it is safe for himself and laborers to work therein.

No miner shall leave his place in an unsafe condition when his laborers are allowed to work after he has gone home.

If the mine boss shall order bad roof to be taken, or shall order props to be set, it shall be the duty of the miner to attend to it without unnecessary delay.

The miner shall also take care in handling his powder. He shall keep it in a covered box in the mine ; this box must be kept well back from the face, and away from the road.

When a miner is making a cartridge, he shall keep his lamp at least four feet away from the nearest part of his box, and in such a position that the air current will carry any sparks away from the box.

He shall not be allowed to make a cartridge with his lamp on his head or his pipe in his mouth, nor shall he set his lamp on his box.

When charging a hole, if the cartridge sticks, he must carefully withdraw it and make it smaller, or enlarge the hole so that the cartridge will push easily into it. No raming a cartridge with a drill will be allowed.

When driving an entrance between two chambers, it shall be the duty of the miner before firing a shot, to give timely warning to the men in the chamber, towards which he is driving, so that they may find a place of safety.

They shall also guard the passages on either side of their place at every shot, so that no person may come unawares upon it when about to fire. They shall also be careful not to go back too soon to a shot which seems to have missed fire.

When a shot has been fired they shall take great care to examine the roof and coal, and see that they are in a safe condition before going to work under them. They shall also see that their car is at a safe distance before firing a shot.

Before loading a car, they or their laborers shall see that no tools, powder or other material is left in the car. After every shot they must see that the road is clear, before the mule shall be allowed to draw the car to the end of the track near the face.

If any gas is given off by blowers, they shall see that no loose coal or slack is left at the face over night, and that no gas is left burning when they leave their place after the day's work is done.

All gob and props must be left at least two feet from the road.

Laborer or Helper.—No miner shall be allowed more than one laborer or helper. He must be subject to the approval of the mine boss, and hired only with his consent.

It shall be his duty to fill the road properly for the mule to travel in.

When head or stoping blocks are provided for the cars to rest against, he shall see that they are properly placed as the empty car goes in.

He shall see that the car has no tools, sprags, or other material in it before commencing to load it.

He shall devote his time chiefly to preparing and loading his coal, but when necessary he shall help his miner set props or do any other work which requires his aid.

Drivers.—It shall be the duty of a driver to take proper care of his horse or mule, and see that it is properly fed and watered. He must not whip or abuse it unnecessarily, or allow any other person to do so. He shall drive it carefully, and when ascending steep grades allow it to rest frequently.

When he leaves his horse or mule at any time, he must be careful to leave it in a place of safety, where it shall be secure from runaway cars or other danger.

When drawing cars into a place he must be careful and not drive his mule or horse any further than the track is laid nor into a pile of coal at or near the face, or to leave the car where there is not ample room to pass.

If the road is in a bad condition for want of filling, he shall report it to the mine boss.

When drawing cars down a graded road he must be careful to sprag them sufficiently to keep them from runing upon himself or animal.

If head or stoping blocks are used at certain points he must see that they are properly placed when he goes in with the empty cars.

If any other person abuses his mule or horse he must report the same to the mine boss.

Nor will he be allowed to send any other person to take out or return his mule or horse to the stable. Nor shall they be driven faster than a walk.

Company Hands.—All company hands must be at their proper places at the appointed hour in the morning.

They shall work ten hours when working full time, and shall see that all instructions given them by the mining boss are strictly carried out.

Door Boy.—It shall be the duty of the door boy to be at his post at all times while the mine is working.

He must not leave his door at the command of any one except the mine boss or driver boss.

Penalties.—For the violation of the above rules and regulations it shall be the duty of the mine boss to suspend, discharge, or otherwise punish any person who shall carelessly or wilfully neglect any of the duties assigned him.

When damage to property is carelessly or wilfully done, the party offending shall be subject to pay the full amount of damage, and may be suspended or discharged for the offence.

General Rules.—All persons are hereby forbiden to enter any old workings without consent of the mine boss.

Any person who opens a door must see it properly closed and fastened before leaving it.

Any person knowing of the unsafe condition of any place or of damage done to the doors, stopings, or brattices, or of obstructions in the airways, shall notify the mine boss, as soon as possible.

Any person found guilty of carelessly or wickedly abusing any animal or other property, shall be held liable for the full amount of damage done.

The length of a shift shall be ten hours.

Any person in the employ of the Company who is found intoxicated upon the works, or who carries liquor into the mine, shall be discharged.

All persons who accept employment with this Company agree to do so subject to the above rules and regulations; and for any violation of them, to be dealt with as the Superintendent may direct.

W. A. Lathrop, Superintendent.

As a matter of great present interest we give above a copy of the rules of the South-West Virginia Improvement Co. that we found posted at the entrance to its mines at Pocahontas on our visit just after the disaster of March 13th, 1884.—*Ed.*

The Virginias.—Supt. J. E. Hilgard of U. S. Coast and Geodetic Survey, in a letter of March 9, says: "I always read "The Virginias" with interest. and am much pleased with your nomenclature of the natural grand divisions of the country."

"Your already highly valuable publication must find an enhanced appreciation with each revolving year. It is the Midas' gift to 'Old Virginia."—Principal J. C. Covell of W. Va. Institution for Deaf-Mutes and the Blind, Romney West Virginia.

"I find the February (1884) number of your valuable magazine even more readable than any of its predecessors. It is an indispensable publication to American statesmen, manufacturers, professors and geographers."—Audley W. Gazzam, Philadelphia, Pa.

Output of Pocahontas Coal mines.—In January we published a statement of the output of coal and coke at the mines and ovens of the Southwest Va. Im. Co., at Pocahontas, Tazewell county, Va., on Norfolk & Western RR., during 1883. Below we present, in 2000 lbs. tons, the output of these mines and ovens during the months of January and February, 1884, kindly furnished *The Virginias* by Supt. W. A. Lathrop.

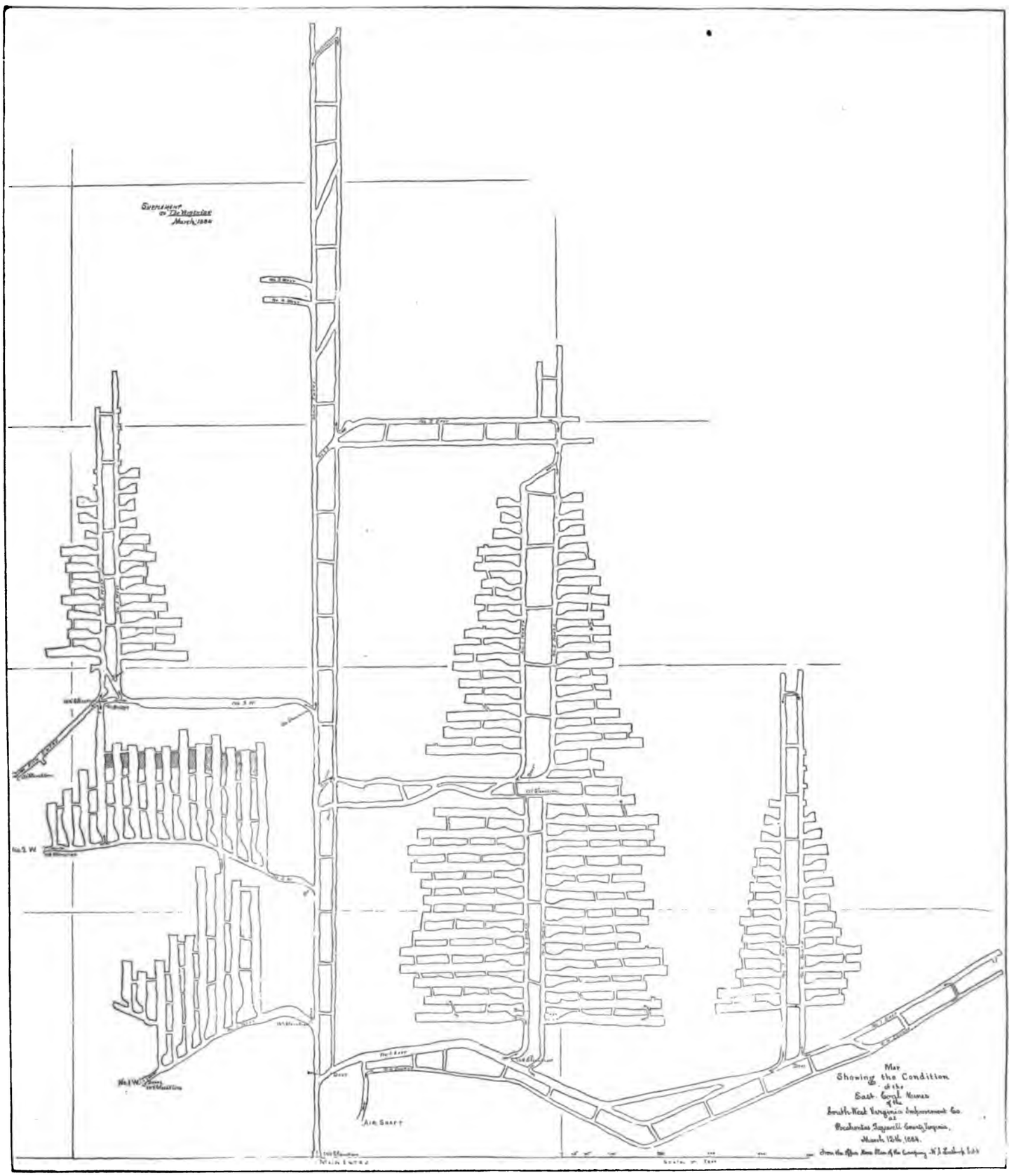
Coal shiped in January, 1884	17,993	tons.
" coked " "	10,853	"
Total January output	28,826	"
Coke shiped in January, 1884	6,200	tons.
Coal shiped in February, 1884	18,750	"
" coked " "	10,668	"
Total February output	29,438	"
Coke shiped in February, 1884	3,224	"
Output of coal from Jan. 1 to March 1, 1884	58,264	"
Coal coked from Jan. 1 to March 1, 1884	21,521	"

The shipment of coke decreased during the month of February in consequence of the stopage, for repairs, of the Crozer blast furnace, at Roanoke, Va., which obtains its supply of coke from Pocahontas.

The output of these mines has been steadily increasing for several months past and the prospects of the company owning them were of the most satisfactory character, warranting the anticipation of great prosperity in its coal mining business during the present year, when, on the 13th of the present month, a sad calamity—of which full details are given elsewhere—overtook it, in a great, and as yet unexplained, explosion,that, in a moment as it were, killed some 120 of its miners and damaged and fired its principal mine in such a way and to such an extent as to necessitate the closing and abandonment of it until the fire can be extinguished and the mine purified and renovated. In the mean time mining operations have been resumed in the West mines, which have before been partially opened, so that while the output, for the time being, will be largely decreased, mining operations will be continued, with the exception of during a single week, and it is not probable that very many weeks will elapse before mining operations will be resumed, on a larger scale than ever, in the now closed mines.

Mr. Frank A. Massie, has, for the present, located at Robert Cash's in the Rockbridge county tin belt, where he will direct further explorations in the tin veins that have there been discovered. His field of operations will extend from the Augusta county line southwestward to the James River or Balcony Falls gap of the Blue Ridge. Mr. Massie proposes to make a thorough study of the Archaean rocks of that region, especially those bearing tin ores. Carefully trained by Professors Fontaine and Mallet in the geological and chemical schools of the University of Virginia, and having had a considerable experience in field geology, Mr. Massie is well fited for the work he has undertaken; this he will prosecute with skill and energy. We look for valuable additions to our knowledge of this interesting region from his researches; he has promised *The Virginias* the result of his explorations.—We are greatly gratified that our young Virginia mining engineers are turning their attention to Virginian fields of labor. There is no equal area in the world that has more to offer in the way of mining resources that need investigation, and none that will better reward the honest and patient investigator,

Mr. Massie's address will be Vesuvius station of Shenandoah Valley RR., Rockbridge county, Va.—He will doubtless have a plenty of company in his explorations, for the reports we have published of its tin ores have attracted wide attention.


Supplement to The Virginias March 1884
No. 1 W.
No. 1 W.
AIR SHAFT
Map
Showing the Condition
of the
East. Coal. Mines
of the
South-West Virginia Improvement Co.
at
Pocahontas Tazewell County Virginia.
March 12th 1884.

(Continued from page 34)

as shown on the map. To the east of Nos. 1 and 2 north, parallel and 500′ distant, are entries Nos. 3 and 4 north, extended some 800′, worked and mined like Nos. 3 and 4, but not to the same extent. The main entry and Nos. 1, 2, 3, and 4 north are connected at their southern ends by No. 1 east and the "air-course," extended some 400′ beyond No. 4.

From the left of the main entry at 270′, 540′ and 925′ respectively, entries Nos. 1, 2, and 3 west turn to the west; No. 1 in 330′ runs to day as entry No. 1 west on Coal branch 390′ above the main entry; No. 2 west in 550′ runs to day, as entry No. 2 west. 510′ up the creek from No. 1 west; and No. 3 west in 650′ runs to day as the "fan" or No. 3 west entry, 150′ up Coal run from No. 2 west. From No. 3 west a double entry, Nos. 1 and 2 west, extends north some 500′ parallel with the main entry; from this as well as from Nos. 1 and 2 west chambers have been mined, and from some of those of No. 2 west the pillars have been robed, those lined diagonally.

The area of mining operations in the East mine, rejecting the extension of the main entry, are embraced in a square of 1500′ sides, or about 52 acres; but the area actually worked out would not be more than 15 acres.—We have reported the actual output of these mines from the time of the begining of shipments in May, 1883, to March 1, 1884, as 177,322 tons. This 12-feet coal bed will yield 12,000 tons to the acre; so the entire output could have been taken from 15 acres. The entries proper of this mine, as numbered on the plan, would make a length of from 3½ to 4 miles.

The levels of the East mine at several points are given on both maps, refering to the mouth of the main entry as the datum level; this on the map on page 34 is marked 0′; in that on page 47 it is put down as 100′. Calling the mouth of the main entry 0′, or zero, the entrance to No. 3 west, from the main entry, is 26′ higher, and the north end of the main entry is 42′ higher; the entrance to No. 1 north is 8′ higher and that to No. 2 east from No. 1 north is 21′ higher; the entrance to No. 1 west, from without, is 9′ above the main entry, that of No. 2 west, from without, 18′, and that of the fan entry is 21′ higher; the air-bridge is 23′ above the mouth of the main entry.—These are important elements in the problem of the ventilation of this mine.

The ventilation of the East mine was effected by a Murphy fan, with arms of 8′ radius, placed at the fan entry, the one farthest up Coal run, operated by a steam engine in an attached building; the fan acted as an *exhaust*, drawing the air that entered at the "air-shaft," or entry, through all the workings of the mine in the direction shown by the arrows in the entries on the map on page 47, the course of the current being made direct and continuous by ventilating doors in charge of door boys.—The capacity of the fan in use was far greater than any demand of the mine with its present area; in fact, so far as we could learn, and from our own experience, there was always a superabundance of fresh air in this mine and the draft of the current passing from the air-shaft to the fan entry was often uncomfortably strong. It is in evidence that some 20 minutes before the explosion took place, L. M. Hampton, the night mine boss, who perished in the mine, sent orders to the engineer in charge of the fan to slacken the speed of the exhaust, "the current of air being so strong in the mine that it blew out the miners' lamps."

The rules for the government of those employed in the mines at Pocahontas, which we found posted at the entrance to the mine, and elsewhere, we give in full on page 45. These are full and plain, providing for all the emergencies which experience had hitherto suggested as necessary to expect in mining in the regular above-water-level bituminious and semi-bituminous coal beds of West Virginia, Pennsylvania and other states, as these were the first mines of this character ever worked to any extent in Virginia.

The explosion.—The known facts concerning the explosion are but few. Mr. W. H. Cochran the general mine boss, had charge of the mine on Wednesday, March 12th., up to 6 p. m., when the night shift of miners took the place of the day shift. He reports that he left everything in perfect order, as far as he could see, with a good circulation of air in every part of the mine. When he left he put the mine in charge of the night mine boss, L. M. Hampton, and retired to his dwelling near the fan entry. Nothing unusual occured until about one o'clock Thursday morning, when Hampton sent a messenger to the engineer at the fan entry to slacken the speed of the fan, as before stated. About twenty minutes after one the first explosion, according to Mr. Cochran, took place, evidencing itself to him by a loud and heavy report following a rush of air and a rattle of fragments like a hail storm, which aroused him from his bed just as a cloud of blazing coal dust with fragments of timbers—mine props from near the entrance to the mine—and other materials blew in his window, broke up his bed and other furniture, filling his room with dust and smoke. His house was directly in front of the fan-entry on the opposite side of the Coal run ravine; some of the board shanties near this house were blown down, others were not. The map shows that the directions of entry No. 2 west and of the fan entry converge; the rush of air from these two entries, laden with coal dust and mine debris, met against the steep bank on the opposite side of Coal run and rushed up the lateral ravine that puts in there from the west, carrying a volume of coal dust and fragments of wood for some distance up that ravine, but not across the spur of the mountain on that side as has been stated. The force of the explosion, in so far as the outside of the mine was concerned, was greater at this point than elsewhere, for the reason stated, and its effects could be seen on the trees and on the ground on the side of the ravine for about 100 yards up and down the run, but no trees of any size were uprooted and the observable effects of it were not greater than a wind of 100 miles an hour could produce. Mine cars that were on the track in the mine were forced out with great velocity, so that these cars were hurled across the ravine, by the force of these converging blasts, and dashed to pieces against the bank and the large trees there standing. Similar blackened spots are opposite the main entry and entry No. 1 west, but they are not more than half as large as the one above described nor is there anything to show that there was as great a rush of air at these entries as at those above. Nothing outside of the mine was set on fire nor were any of the trees chared, although coal dust penetrated the bark of some of the larger trees quite deeply. Mr. Cochran says he heard five distinct reports from the explosion, but a ocomotive engineer, who had just pushed a train of mine cars into the main entrance, reports that he heard but three.

After sending for Supt W. A. Lathrop, Mr. Wm. H. Cochran, the inside mine boss, an old Cornish miner, accompanied by two miners, Wm. Whittaker and John Peters, went some 300′ up the main entry, to just beyond the entrance to entry No. 1 west, when they were driven back by after-damp; no bodies were seen Soon after, with the same miners and John Jones, outside boss, he went up the main entry to No. 1 east, which he followed some 200′, or about half way to No. 1 north, where a mutilated body was seen. They then returned to the main entry and went up it about 500′, or nearly to No. 2 east, where another body was seen nearly covered up with scale coal; just beyond this point it was found unsafe to go, on account of after-damp, so they returned to entry No. 1 east again and went up it to near No. 1 north, where was seen a portion of the

blackened leg of a man; they were again forced to retire.—Some time afterwards Mr. Cochran, with Sam. Morley, Geo. Britton and a Hungarian, entered the air-shaft and followed the air-course and penetrated No. 1 east some 700', or nearly to No. 3 north, where were found two bodies, the clothes of one of them on fire; a little further on the Hungarian stired up burning slack coal with his foot and they beat a hasty retreat, realizing that the mine was on fire, and that they would be speedily suffocated, as it was they were all sickened by the foul air.

Wm. Culbreth, assistant mine boss, and Tom. Harman, both experienced miners, about 10 a. m. of the 14th, entered No. 1 east entry, by the air-course, some 200', where they found in the entry a mass of burning coals which forced them to return. Their report convinced Supt. Lathrop that the mine was on fire, and that it was useless to make further efforts to penetrate to the workings and recover the bodies of the miners; he then ordered the entries to be closed, hoping thereby to keep the fire from spreading.

Very soon after the explosion Supt. Lathrop telegraphed to the Midlothian coal mines, Chesterfield county, Va., asking that some of the mine bosses and miners who were accustomed to work in the mines of that locality, which are very deep, under water-level, and where fire-damp and other deleterious mine gases are frequently encountered, would speedily come to Pocahontas, bringing safety lamps, etc., and aid in recovering those entombed in the mine, or at least their bodies, and in ascertaining the condition of the mine. In response to this request Col. George S. Dodds and Mr. Wm. Clifford, mining experts, and a party of experienced miners at once left for Pocahontas by special train; they arrived there about 5 a. m. of the 14th, the day following the explosion. In the meantime Supt. Lathrop had removed the small fan at the entrance to the West mine and erected it at the fan entry of the East mine, hoping that by its aid the mine could be ventilated so it could be entered. After the arrival of Col. Dodds and party and an examination of the condition of affairs, it was decided that it would be dangerous to use this fan, as it would only promote the conflagration within; it was also decided that the mine could not be entered in its present condition. A conference of the mining experts present led to the conclusion that the only thing to do was to close all the entrances to the mine as tightly as possible, with double brattices, or partitions of heavy timbers with some 8 ft. of fire-clay tamped in between them, this making a water-tight dam across each entrance, and then to proceed at once to inject steam into the mine, as this could be done speedily from the engine at the machine shop and from the locomotives at hand; and then to make preparations to flood the mine with water from Coal run. This sealing up of the mine was speedily accomplished and several engines put to work forcing in steam. The Midlothian party returned home on the 15th, as they could be of no use at Pocahontas. The same day Mr. J. P. Ilsley, President of the Southwest Va. Improvement Co., arrived from Philadelphia, where is the principal office of that company.

After it had been decided to flood the mine a steam pump of large capacity was obtained from the Crozer Steel & Iron Co., at Roanoke, Va., and attached to the engine at the machine shop near the fan entry. Mr. C. H. Duhring, the President of the Flat-top Coal Co., (the one that is arranging to very soon open a number of mines in this "big bed" of coal in the lands northeast of Mill creek, which will be reached by an extension of the N. & W. Ry., down Bluestone river), who has had a large experience in the boring of oil wells in Pennsylvania, happened to be in Mercer county at the time of the explosion; he promptly came to Pocahontas, as also did Mr. J. H. Bramwell, Superintendent and Mining Engineer of the same company, offering their assistance. When it was decided to flood the mines it was well known that it would be necessary to have shafts sunk from the surface of the ground above, on the State-line spur, down to the ends of the entries, so that vent could be had for the air and gases that the inflooding water would force to the upper levels of the mine. Mr. Duhring suggested that the speediest way to get these shafts would be to bring from the oil regions a well-boring outfit and bore 6" holes down through the strata from the surface,—offering at the same time to go in person to the oil region and procure this outfit and experts to drill the holes. His offer was accepted and he left on the 15th, and in a few days had the men and machinery at Pocahontas and the work of drilling out these shafts is now in progress. It was thought that the deepest one would not be more than 250' deep, but levels were being run to ascertain the exact depth when we left.

Up to this writing, March 19, it is reported that 114 men and boys were in the mine; 65 of these were whites—26 of them Hungarians, the others a few French, Germans and Italians, and the rest mainly from Virginia, West Virginia and North Carolina,—and 49 blacks, mostly from Virginia. Of course all of these have perished, and probably some others, as the miners were in the habit of taking in with them men not regularly employed to aid them in their work.

This sums up all that is really known concerning this remarkable explosion up to this time. The newspapers of the country have been filled with all sorts of exaggerated statements concerning the outside effects of the explosion and of what was seen by those that succeeded in entering short distances into the mine; still worse have been the lying statements that have been circulated in reference to the conduct of the two or three hundred miners left at Pocahontas without mining employment by this explosion. Everything there has been quiet and orderly and there has been but little open lamentation, for the reason that not more than a half dozen resident families lost relatives in the mine. Not a body or a fragment of a body has been exposed to daylight. The Superintendent immediately after the explosion, offered employment to all the men there in clearing away the rubbish around the entrances, righting the railway tracks, closing the entrances to the mine, and in a general clearing up of the ground around the village and the mines, which had been neglected because of the pressing demand for coal—of which the mine was puting out from 1,000 to 1,400 tons a day—which absorbed all the labor that could be procured.

On the 17th, the Monday after the explosion, men were at work erecting a fan at the entrance to the West mine and repairing the railway track so that mining operations could at once be resumed in that mine, and we saw a notice posted asking all miners that wished employment in that mine to report for duty. Many of the 200 coke ovens were in blast and others would be put in at once, as there is a large bank of slack coal, that removed from the main entry in driving it to begin regular mining, near the main entrance, that can be used in the coke ovens.

Of course there is a feeling of sadness and gloom prevalent throughout this little mining town, but the miners know that the company has suffered great pecuniary loss, that it has done all that could possibly be done to rescue their friends and comrades from the mine or to recover their bodies, and that they have its sympathy and aid, which have been authoritatively tendered by a meeting of the directory in Philadelphia, and extended by the officials at Pocohantas. Whatever may have been the cause of the explosion the intelligent ones of the miners do not consider that there has been culpable negligence in the management of the mine; it has been as carefully operated as the very best in coals similarly disposed.—No men ever behaved better under similar circumstances than have these men, though representing so many nation-

alities as well as two distinct races. They deserve well of our people, and we hope the following appeal, on which we see the names of the worthy superintendent, Mr. W. A. Lathrop and his most estimable wife, for the aid of the families of the victims of the disaster, will be liberally responded to:

Pocahontas, Va., March 29, 1884.

Editor Lynchburg Daily News: We understand that some malicious minded person or persons have been circulating reports to the effect that we are not in need of funds for the alleviation of the suffering of those left destitute by the recent disaster at this place—and the result has been a meagre response to the call for aid. Trust you will publish and other papers charitably inclined will please copy the appended proceedings of a meeting. Any aid in the shape of money or food and provisions will be thankfully received and receipted for by Mr. E. S. Haney, Treasurer of the Relief Committee. Calls for help come in daily from widows at a distance who have lost their husbands in the mines. J. O Moore,
Secretary.

Pocahontas, Va, March 19th, 1884.—At a meeting of the Citizens' Relief Committee held tonight to solicit subscriptions of aid to the sufferers of the recent disaster, the following officers were elected:

President, W.O. Davis; Secretary, J. O Moore; Treasurer. E. S. Haney; and Mrs. W. A. Lathrop, Mrs. Wallace Drumheller, J. N. Bergley, and W. A. Lathrop, directors.

The following resolutions were adopted:

1st That the Board of Directors are hereby instructed to take immediate steps to relieve the present necessities.

2d. That they obtain as soon as possible, the names of families deprived of their support and their necessities.

3d. In view of the fact that there are undoubtedly many families scattered through the State and elsewhere, unknown to the Committee, dependent on the lost, be it hereby resolved that the co-operation of the press and of the town authorities is requested to assist in obtaining information.

4th. The Directors are instructed to prepare a plan seting forth what can be done to furnish employment to those able to work, and what is advisable to assist others. J. O. Moore,
Secretary.

It should be recorded in this connection that on the 14th. the Legislature of Virginia, then in session, took steps to appropriate $2,500 for the immediate relief of the sufferers by this explosion, and this sum would have been given if the President of the company had not telegraphed the Governor that such aid would not be needed, "as the directors and friends of the company are doing and will continue to do everything that is necessary to relieve the distress that has been occasioned."—The Norfolk & Western Ry. promptly offered any assistance it could render, and the citizens of Lynchburg promptly took action to send relief to those needing it.—The board of directors of the S. W. Va. I. Co. met in Philadelphia, where their principal office is, the morning after the disaster, and at once "decided to instruct the superintendent at the mine, Wm. A. Lathrop, to do all possible to recover the bodies and relieve the distress of the families of the victims."—A cablegram from London, England, where some of the stockholders of this company live, was also received offering assistance.

Superintendent Lathrop has been instructed by his company to ask the council of the American Institute of Mining Engineers to appoint a commission of well known mining engineers, men experienced in working both bituminous and anthracite coal mines, to thoroughly investigate this disaster and, if possible, to ascertain the cause of the explosion and to make suggestions as to what may be done to guard against any repetition of such there in the future. We learn that this request has already been sent to Dr. Raymond, the secretary.—We would also like to have Director J. W. Powell of the U. S. Geological survey send some of his experts to investigate this matter as pertinent to the work of the survey now going on in the region that embraces these mines.

The cause of this explosion will probably, in most particulars, always remain a mystery, as no witness of it survives; but it is reasonably to be expected that much information on this subject will be obtained when the mine is again opened and opportunity given to inspect its condition as left by the explosion; but even this evidence, which it is not likely will be had for some time to come, will be comparatively worthless if fire has spread much in the mine, for that, in such a free burning and coking coal as the Flat-top, would soon obliterate most traces of the explosion, even to the cremating of the bodies of its victims. In the meantime, from the first news of this disaster, many theories have been advanced to account for it, some of them absurd, others sensible if the conditions on which they were based had been those of this locality, and others that may be accepted in part.—Many of the statements that have been published as to the opinions of those informed in such matters are untrue, as we know from one that has gone the rounds of the papers attributed to the writer, which represents him as saying that in his opinion blasting-powder was the principal agent, when his only statement was that powder was probably one of several agents that caused or helped the explosion.

The known causes of explosions and fires in mines are very numerous. Accidents most of them are called, but they are generally the result of wilful and inexcusable carelessness or of stupid and surprising ignorance on the part of the miners; violation of the known rules of the mine and of the repeated cautions of those in charge. The miner will hang his burning lamp on coal or timber and leave it there to ignite timber or the coal or to liberate gases, by its heat, that will suddenly take fire; he will fill cartridges with powder, from an open keg or from a pile of it poured out on the floor of the mine, with a burning lamp from which hot oil drips hung to his cap, and hanging over the powder; he will light his pipe and smoke siting on or beside a keg of powder, or on a pile of straw; will clean his lamp or oil can with rags or "waste" and then throw the oily rags aside, perhaps on a pile of fine coal or coal dust where are the materials for spontaneous combustion, (Just as a few days ago in Frankfort, Ky., where a new warehouse was set on fire by a bucket of coal on which some greasy rags had been thrown); he will persist in exploding—"flashing" he calls it—the gases of combustion, that result from firing his blasts, although strictly forbiden to do so, that he may sooner get back to his "breast" and load up the coal broken down by the blast, notwithstanding the fact that himself or his comrades, are often badly burnt by such explosions.

Before stating our opinion as to some of the causes that may have led to or promoted this terrible calamity, it may be well to very briefly summarize, without giving names, some of the causes mentioned in the newspapers that have come under our notice, most of them given as the statements of experts in mining matters. For example: "All know that it was caused by an accumulation of gas at a time when the operators were not aware of its presence."—"That the dimness and uncertainty of the lights was caused by gas, and that had the current of air been increased rather than diminished, an explosion might have been prevented."—"That a large fall of coal let in a blast of gas from some underground reservoir."—"Carelessness in the use of powder with which the miners were blasting coal."—"A gas reservoir."—"The ordinary accumulation of fire-damp."—"One of the miners struck a fissure filled with gas"—"This is a dusty mine and coal dust contributes largely to the force of explosions in coal mines. Many of the men employed were inexperienced in blasting, and the force of a blow, shot out in an atmosphere containing an admixture of fire-damp too small to be detected by the Davy safety lamp, is increased manifold by coal dust. Different varieties of coal produce differ-

ent lengths of flame."—"Blowers or feeders, which issue from coal, are met with in coal mines. They often contribute to explosions. They are generally met with in straight work or entries driven in advance of the work."—"It is pretty well determined that the explosion was caused by fire-damp."—"The accident, it is thought, was caused by the men going too far into the mines with their lamps."—"Caused by the igniting of natural gas which had been accidentally liberated from fissures, by the miners' lamps."—"That the miners at the extreme end of the heading of the main entry struck a pocket of gas that caused the explosion."—"It is stated that powder had been placed at different points in the mine, and when the explosion occured flames shot up in the air over 100 feet high."—"The explosion was caused by a blast which probably opened up a large quantity of gas."—"Fire-damp liberated by blasting or fire-damp accumulated in the mine."—"A comparatively small quantity of gas mixed with fine coal dust, would form an explosive force of terrific power."—"A dangerous excess of moisture combining with the carbon in the finely comminuted particles of coal dust, aggravated by the forcing in of damp and cool air by the fan, combined with the carbon of gunpowder just after its explosion, produced the elements of the fatal explosion."—"Carelessness is alleged as the cause of the explosion."-"No safety lamps were used, and it is said that the fan which supplied air to the mine was of insufficient power."

As the composition of coal is an essential element in determining its tendency to generate gases, we give below, as No. 1, the analysis of a sample representing a complete section of 11′ 8″ of the big coal bed of this mine, sampled and analyzed by chemist A. S. McCreath, of the Second Geological Survey, of Pennsylvania. For comparison, we add, as No. 2, an analysis of Midlothian, Va., screened coal, and of Connellsville, Pa., Broad-ford coal, as No. 3, also made by A. S. McCreath:

	No. 1	No. 2	No. 3
Volatile matter.....	20.738	38.23	30.107
Fixed carbon.....	73.728	54.27	59.616
Sulphur.....	0.618	1.54	0.784
Water	0.932	1.03	1.260
Ash.....	3.984	9.47	8.233

It will be seen from the above that the Pocahontas coal has nearly 18 per cent less volatile matter than the Midlothian which is so subject to fire-damp and in which there have been so many fatal explosions. We may also add, from an experience of 10 years in burning New River, W. Va. coal, the same as Flat-top in character, that it burns steadily and without spurts of gas flames like the bituminous coals containing a large percentage of volatile matter.

In the admirable paper on "Fires in mines, their causes, and the means of extinguishing them," by R. P. Rothwell, M. E., in vol. IV, p. 54, of Trans. Am. Inst. M. Engs., there ie gathered a large amount of information on this subject. In one table there given, by a high authority in such matters, it appears that of 11 varieties of coals the *least* self-inflammable ones were those that contained the least percentage of water; in the same connection it is stated that all soft coals rich in volatile matter, and poor in fixed carbon are especially liable to lose their volatile constituents, the included gases, when exposed to the atmosphere, particularly if exposed to a high temperature and moisture. The composition of the Flat-top coal, as above given, removes it from the list of highly self-inflammable or of self-gas-producing coals under ordinary atmospheric influences.

Without commiting ourselves to any theory of the cause of the Pocahontas mine explosion, and again declaring that we do not consider the mine management responsible for it, because it had taken all the customary precautions of similar mines to guard against it, we think, from what we can gather that is worthy of consideration, that it resulted as a whole, from the following:

1st.—The firing or "flashing" of the gases of combustion, resulting from blasting operations, in a large number of the chambers worked, at about the same time, by the miners; these explosive gases having possibly at that time accumulated more than usual in consequence of the large amount of blasting then being done to obtain a large output (1,600 to 1,400 tons a day in a comparatively small mine) and in consequence of the condition of the atmosphere, as it is probable, from the kind of weather then prevailing, an easterly storm, that the mine was within an area of low barometer. The height of the roof of the mine would allow the presence of this gas to go undetected for some time, and it is a question whether the system of ventilation in use—efficient as all know it to have been for supplying fresh air—would withdraw these gases or dilute them sufficiently to render them harmless.—The miners were forbiden to fire these gases, but there is no questioning the fact that many of them constantly did it "on the sly."

2nd.—The use of a large quantity of blasting powder (Laflin and Rand 3 F)—though no more than is customary in such mines—necessitating, or allowing, that each miner should take in a keg at a time, so that there must have been from 100 kegs upward in the mine at the time; and especially the use of powder by so many inexperienced men, many of them speaking only foreign, and to those overseeing them unintelligible languages,—no matter how carefully they were watched.

3rd.—The unavoidable accumulation of coal dust in such a remarkably dry mine, along all the entries and air-courses and in the chambers, doubtless furnished a vehicle for spreading the effects of the explosion, no matter what may have been its original cause or location.

We can readily understand, from what we have seen and learned, that there is enough to account for this explosion and its results in the three things above enumerated, to go no further. We do not pretend to say that other things may not have originated or promoted it; but of such we can only learn when access can be had to the mine.

The lesson of this explosion for our Virginia and West Virginia mine owners, as well as of those of other states, in the westward slope of the great Coal basin of the Ohio, is: that they must, in some way, absolutely stop the "flashing" of gases by the miners; that they must, in all cases, provide air-shafts or through-cut air-courses for the escape of gases, etc., especially the light ones; that they must find some other explosive than blasting powder, or some coal-cuting machinery that will do most of the work now done by powder; and that the very dry mines must be, in some way, thoronghly moistened or damped.

The Crimora Manganese mine, in the western Blue Ridge, Augusta county, Va., has been connected with Crimora station of Shenandoah Valley RR. by a branch railway, of standard gauge, 2.26 miles long. This mine has now for a number of years been one of the most productive of high grade manganese ores in the country. Its present daily output is about 10 tons, but this will be increased when the dryer season comes.

Analyses of James River Iron Ores. — Dr. Henry Froehling, analytical chemist, of Richmond, Va., has favored *The Virginias* with a very interesting series of analyses, that he has recently made, of samples of iron ores from near the line of the Richmond & Alleghany Ry., along James River, in Midland, Piedmont, The Valley and Apalachia, collected by Capt. Henry C. Lee.

These analyses are of ores from the Archaean, the Potsdam, and the Lower and the Upper Silurian formations; they offer a great variety for the iron maker to choose from and each can be mined in almost any desired quantity on the line of this railway, one that has direct connections to the coking coals of New River and Flat-top.—The samples were all dried at 212° previous to analysis.

	No. 1	No. 2	No. 3	No. 4
Silica	14.700	21.800	2.64	2.96
Iron, sesquioxide	73.530	59.540	95.77	94.15
Iron, protoxide	.....	0.840	.....	.....
Iron, bisulphide	.....	1.699	.....	.....
Cobalt and Nickel	.....	trace.	.....	.....
Manganese, protoxide	1.050	0.302	trace.	0.13
Alumina	4.640	11.600	trace.	0.61
Lime	0.140	0.250	0.28	0.31
Magnesia	0.260	0.540	trace.	0.13
Phosphoric acid	0.402	0.280	0.04	0.112
Sulphuric acid	0.027	0.031	.....	.....
Titanic acid	.....	0.603	0.71	0.96
Water	5.140	2.360	0.56	0.68
	99.889	99.845	100.00	100 042
Iron, metalic	51.170	43.140	67.04	65.910
Manganese, metalic	0.756	0.216	.....	.....
Phosphorus	0.175	0.122	0.31	0.49

No. 1, is of iron ore from Sleepy Hollow mine, near Norwood, Nelson county, Va.—*No. 2*, is of magnetic specular iron ore from farm of C. Y. Morris, near Hardwicksville, Buckingham county, Va.—*No. 3*, is of specular iron ore from vein No. 6½, of Riverville, Amherst county, Va., sampled by Thos. Dunlap. *No.* 4, is of specular iron ore from vein No. 6, Riverville, Amherst county, Va., sampled by Thos. Dunlap, of Stapleton, Va.

	No. 5.	No. 6.	No. 7.	No. 8.
Silica	5.91	11.41	5 04	4.18
Iron, sesquioxide	90.01	82.41	93.05	92.25
Iron, bisulphide	0.02	trace	0.07	0 09
Manganese, protoxide	0.05	0.19	0.18	0.09
Alumina	2.01	2.46	1.23	0.91
Lime	0.03	1.16	0.05	0.06
Magnesia	0.02	0.23	0.06	0.07
Phosphoric acid	0.238	0.673	0.066	0.082
Sulphuric acid	0.01	....	....	....
Titanic acid	....	0.29	....	....
Water	1.70	1.14	0.71	0.93
	99.998	99.963	100.406	98.642
Iron, metalic	68 01	57.69	65.14	64.58
Phosphorus	0.104	0.294	0.029	0.036

No. 5 is of sample of specular hematite from "Maude" vein, Stapleton, Amherst county, Virginia, from Thomas Dunlap.—*No. 6* is of specular hematite from "Wingfield" vein, No. 11, Stapleton, Amherst county, Va., from Thomas Dunlap.—*No. 7* is of specular hematite from "Greenway, No 1, Harris," from Thos. Dunlap, Stapleton, Amherst county, Va.—*No. 8* is of specular hematite from "Greenway vein No. 16," from Thos. Dunlap, Stapleton, Amherst county, Va.

	No. 9	No. 10	No. 11	No. 12	No. 13
Silica	6.140	11.300	19.000	2.060	2.460
Iron, sesquioxide	79.471	75.370	62.440	80.290	82.205
Iron, bisulphide	.....	0.578	0.227	.....	.....
Manganese, protoxide	0.270	0.600	0.894	1.570	0.280
Alumina	1.533	2.310	5.160	3.646	3.353
Lime	0.360	0.940	0.650	0.180	0.290
Magnesia	0.252	0.108	0.252	trace	0.144
Sulphuric acid	.....	0.085	0.014	.....	.....
Phosphoric acid	2.296	0.387	0.822	0.964	1.062
Water	9.246	7.830	10.700	10.842	9.829
	99.658	99.508	100 259	99.682	99.623
Iron, metalic	55.629	52.900	43.710	56.203	59.644
Phosphorus	1.001	0.168	0.358	0.420	0.462
Manganese, metalic	.....	.....	0.644	1.131	.....

No. 9 is of a sample of brown hematite iron ore from the Arcadia furnace lands, near Buchanan, Botetourt county, worked by Henry Body.—*No. 10* is of brown hematite from mine at Lick Run, Botetourt county, Va., sent by Joliffe, Dillon & Co.—*No. 11* is from mines of Salisbury furnace, Botetourt county, Va.—*No. 12* is of brown hematite from T. E. Sheets' property, mined by J. H. Burks, at Eagle Rock station, Botetourt county, Va., sampled to represent average output of mine.—*No. 13* is of brown hematite from J.L. Peak's property, at Eagle Rock, Botetourt county, Va.

	No. 14	No. 15	No. 16	No. 17
Silica,	12.060	4.960	9.200	6.400
Iron, sesquioxide	71.278	81.108	73.720	82.338
Iron, bisulphide	.....	.....	0.166	.....
Manganese, protoxide	0.570	trace.	0.490	trace.
Alumina	3.837	2.237	4.680	6 694
Lime	0.468	0.390	0.150	0.246
Magnesia	0.280	0.144	0 288	0.216
Phosphoric acid	0.785	1.155	0.673	0 968
Sulphuric acid	.....	.....	0.094	.....
Water	10.376	9.946	10.500	3.036
	99.654	99.940	99.961	99.898
Iron, metalic	49.891	56.776	51.600	57.636
Managanese, metalic	0.410	.....	0.380	.....
Phosphorus	0.342	0.503	0.293	0.422

No. 15 is of brown hematite from R. L. Goddard's mine at Big Hill, Botetourt county, Va.—*No. 14* is of a sample of iron ore from the Wilton mines of D. S. Cook, near Wilton station, Botetourt county, Va. Another sample from the same mine gave metalic iron 50.181, metalic manganese 0.365, phosphorus 0.353.—*No. 16* is of a sample of 39 pieces, weighing 21 pounds, from the Wilton mines of D. S. Cook, near Wilton station, Botetourt county, Va. *No. 17* is of red shale iron ore from Clifton Forge mine, near Iron Gate station, Alleghany county, Va., worked by Henry Body.

The Virginias.

Serial No. 52. Vol. V.—No. 4.

Staunton, Va.. April, 1884.

Jed. Hotchkiss, Editor.

The Virginia China Clay and Fire Brick Co. is now busily engaged in the manufacture of fire brick at its works at Lipscomb, on Shenandoah Valley RR., Augusta county, Va.,where it is now making about 2,000 pressed brick a day, using some 10 tons of clay from beds at the works. This product will be more than doubled early in May, by which time the new kilns will be in working order.—The officers of this company are: W. A. Wilson president and J. F. Sweeney secretary, Wheeling, W. Va.; and J. S. Lipscomb superintendent at the works, Lipscomb, Augusta county. Va.

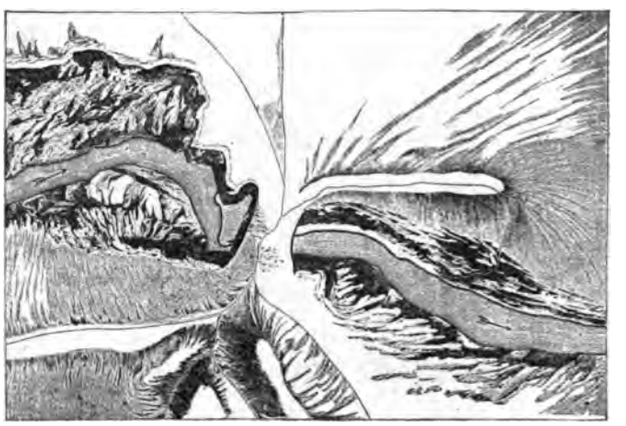
It is very gratifying to be able to state that this company will in a few days be able to fill the orders of furnaces, coke ovens, etc, for first-class fire brick, such as will stand the test of hard work under almost any circumstances, as was proven by trials of bricks made from the clay dug at these works before this company began operations. This new industry will save to our state, every year, a great deal of money. for we are constantly bringing here hundreds of thousands of fire brick from other states, and our demand for them will steadily increase as our iron and coke making and other fire-brick-using industries develop. We hope all our consumers of fire brick will try these of the "Old Augusta" brand. Local industries are made strong by local support.

Pocahontas mine examination.—It was stated in *The Virginias* for March that the president of the S. W. Va. Improvement Co. had asked the council of the American Institute of Mining Engineers to appoint a commission of mining experts to examine the mine at Pocahontas, in which the recent fatal explosion took place, and if possible ascertain the cause of that calamity and to suggest what can be done to prevent its recurence. This request has been complied with and the council has named the following well known mining engineers, all gentlemen of ability and large experience in coal mining work: Mr. Stuart M. Buck of Coalburg, Kanawha county, W. Va.; Mr. Irving A.Stearns of Wilkes Barre Pa.; and Mr. J. Herbert Bramwell of Roanoke, Va. These gentlemen have accepted this disagreeable duty, solely in the interests of truth and humanity, and will meet at Pocahontas on the 25th instant to commence this investigation. The character and professional reputation of these experts is such that we may say, in advance, that they will thoroughly investigate this great disaster and find out all that can be known about it and its cause, and that then they will not hesitate to make known the conclusion they have reached.

Victoria Furnace, of the Iron and Steel Works Association of Virginia, limited, near Goshen, Rockbridge county, Va., on line of Chesapeake & Ohio Ry., Capt. Wm. N. Page general manager, went into its first blast May 1st., 1883; it went out of blast on the 14th instant for the purpose of relining the furnace and making some alterations which have been contemplated for some time. Only about 30′ of the top of the lining was damaged; this could have been repaired without going out but for the contemplated changes. The crucible of this furnace has been a cause of continuous trouble from the time it went into blast; now that will be put in good order.

The total output of pig iron at Victoria, during this less than a year's blast, was 25,450 tons, an average of a little more than 100 tons for each 24 hours the blast was on. The largest output in one day was 153 tons. When this furnace goes into blast again, which will be as soon as repairs and needed alterations can be made, it is confidently expected that its output will be not less than 1,000 tons a week.

It is gratifying to have it in out power to say that the orders for the Victoria pig iron cover more than its output; a state of things that speaks well for the character of its product in these days when so much pig iron is thrown upon the market.



Map of Natural Bridge of Virginia.—By French Engineers in 1782.

Cincinnati Iron Market Report.–Under date of April 21, 1884, E. L. Harper & Co., send to *The Virginias* the following report of the Cincinnati iron market:

The business of the past fortnight has been much more active, prices having touched such a low stratum that buyers feel quite secure in prevailing figures. While in some round lot transactions some furnaces have made slight concessions the tone of the market is stronger than a fortnight ago. Were the uncertainties between the proprietors of foundries and mills and their employees removed, and the disturbing political agitations suppressed, a feeling of comparative satisfaction would prevail, and a brighter outlook be safely anticipated.

We quote, as prices current, at 4 months:

Foundry.

Virginia strong neutral coke No. 1, at	$19.00 to $19.50.
" " " No. 2, at	18.00 to 19 00.
"Queen" American Scotch	19.00 to 19.50.

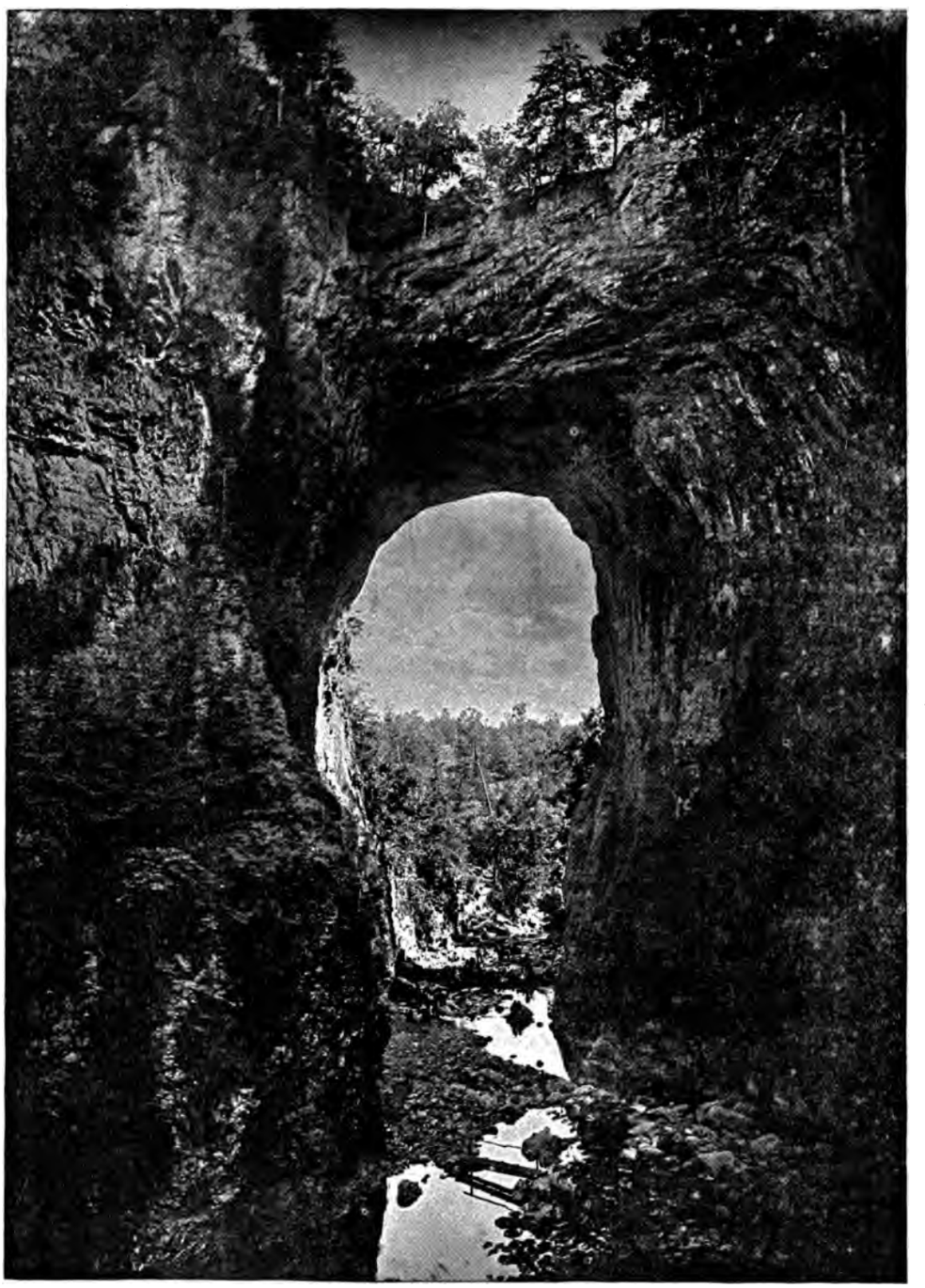
Gray Forge.

Virginia neutral coke	$17.00 to $17.50.
Virginia cold-short	16.50 to 17 00.

Car-wheel.

Virginia warm-blast charcoal	$24.25 to .....
Southern coal-blast	26.00 to 26.50

Low Moor furnace of the Low Moor Iron Co. of Virginia, at Low Moor station of Chesapeake & Ohio Ry., Alleghany county, Va., after undergoing extensive repairs, went into its second blast Sept. 23, 1882; from that date to April 12, 1884, the output of this furnace has been 58,992 tons of pig iron. In the 566 days embraced in the above period its average daily output, making no allowance for stoppages, was 104.2 tons. This fine furnace now runs with remarkable steadiness and regularity, its weekly product for the past 14 weeks averaging 800 tons a week.—Col. W. H. Goodwin is the managing director of this iron company.



The Natural Bridge of Virginia, from the West.
From nature in 1883.

The Natural Bridge, Virginia, Hotels, from the East.

The Natural Bridge of Virginia.

In this number of *The Virginias* the famous Natural Bridge of Virginia is the subject of a number of deeply interesting illustrations prepared especially for this journal.

First in importance is the view of the Bridge on the preceding page, as seen to the eastward from a point west of the Bridge; this picture embraces not only the Bridge itself, but also the charming landscape beyond that is framed by its arch. This is an exact reproduction of a photographic picture; therefore it represents the Bridge and its surroundings as they actually appear.

Above is a view of the delightful group of buildings that together form the Natural Bridge hotel. These are on the eastern slope of the ridge which Cedar creek trenches through and forms the gorge which is spaned by the Bridge. This photographic view shows that Col. H. C. Parsons, the proprietor of the Natural Bridge estate, has made ample provision for the pleasant accommodation of the thousands of visitors that now annually visit the Natural Bridge, which, from the time when it was first made known to the world by the illustrations and descriptions in the Travels of the Marquis de Chastellux in North America in 1780-2, has always been regarded as one of the most remarkable of Nature's wonders; one that never disappoints the visitor, no matter what may have been his expectations concerning it. His hotel is in the immediate charge of Mr. Eugene Peyton, a gentleman deservedly well known as a manager of Virginia summer resorts.

It may be well to add, while calling attention to the Natural Bridge, that it is by no means the only attraction at its locality. It is in one of the most beautiful portions of the Great Valley of Virginia, a valley that in itself and its surroundings has as many attractive features as any equal area in the wide world.

The two views of the Natural Bridge and the map of its vicinity, on pages 66 and 67, are photographic reproductions, on a reduced scale, of the copper-plate engravings that illustrate the English edition of 1787 of the American travels of the Marquis de Chastellux. These were from drawings and measurements made on the spot, by Baron de Turpin and his assistants of the French Engineers, in May, 1782. The Baron's descriptions and detailed measurements, made with all the care and skill that characterized the corps to which he belonged, will appear in the May number of *The Virginias*. The Marquis de Chastellux's account of the Bridge is reproduced on page 65; hereafter will be given Jefferson's description from his Notes on Virginia, written in 1781 and first published in Paris. Mr. Jefferson about that time became the owner, by a patent, of the Natural Bridge estate.

The Natural Bridge is in the southern part of Rockbridge county, Virginia, over Cedar creek, about a mile above the mouth of that creek in James river and a few miles above where that river breaks through the Blue Ridge. It is reached from Natural Bridge station of the Richmond and Alleghany Ry., at the mouth of Cedar creek, by a carriage ride of 1½ miles; or from Natural Bridge station of Shenandoah Valley Ry. by a ride of the same length.

The Pocahontas explosion.—Verdict of the Coroner's jury.—As part of the history of the mine explosion at Pocahontas we publish the following :

Virginia,—Tazewell county, to wit:—

An investigation taken at the machine shops of the Southwest Virginia Improvement Company, near Pocahontas, in the county and state aforesaid,on the 11th day of April, 1884, before A. P. Brown, justice of the peace, and ex officio coroner of said county, upon the body of James Crim (supposed to be) and the bodies of ——— and ——— two other persons unknown, then lying dead. The jurors sworn to inquire when, where and by what means the said James Crim and the two unknown persons came to their death, and after hearing the evidence offered on the day aforesaid, at the office of and in the store of the Southwest Virginia Improvement Company, to which place and time they were duly adjourned by the said A. P. Brown, justice and ex-officio coroner as aforesaid, which adjournment was immediately after the view of the said bodies, announced by the sheriff of said county in the presence of said justice, jury and the people there present, upon their oaths do say : That upon the 13th day of March, 1884, at about 1 a. m., an explosion occured in the mines owned and operated by said Southwest Virginia Improvement Company, situated near Pocahontas in said county ; that the said James Crim and the two unknown persons were employees of the Southwest Virginia Company, were in the mines at the time of said explosion, and then and there instantly came to their death by that means.

That the said company began prospecting said coal mines in the fall of 1881 and began operations in said mines in January and continued until the time of said explosion—except from two to four months in the winter of 1882-3 —and during all this time no gas or fire-damp had ever been discovered in said mines. Said vein of coal measuring 12 feet and lying almost horizontally and entirely above water level, and well ventilated on suction principles and well drained, and that the ventilator runing at half speed was sufficient to ventilate the whole mines. The fan was the latest Murphy patent, and was run by steam power, and was runing at unusual speed on the night of the explosion. That said three persons and from 110 to 120 others, employees of said company, we feel satisfied from the evidence, came to their death from said explosion. Part of the dead bodies found show that up to the time of said explosion they were following and performing their usual avocations and duties in said mine ; that some with pick in hand, others with the drill and others in the act of eating their midnight dinner ; and we are constrained to say that from all the evidence produced, and upon a full and searching examination of witnesses, we fail to find any wrongful act, neglect or default on the part of said company, its officers,agents or employees, but are on the contrary,of the unanimous opinion that the agents and employees of said company used all precautionary measures and that said company spared neither means or skill in operating and conducting said mines for the preservation of the lives of the employees working therein.

As to the cause or causes of said explosion we are unable to say whether from coal-dust, powder or fire-damp, or by striking a vein of gas in blasting or drilling, and from the evidence of experts who testified, it may never be known, as an explosion or the presence of gas or fire-damp in such mine was unexpected, unforeseen and the explosion unavoidable.

Given under our hands this 11th day of April, 1884.

A. P. Brown, J. P., Acting Coroner.

Wm. G. Moore,	Wm. G. Mustard.
R. G. Crockett,	W. E. Peery,
Jas. H. Wingo,	A. M. Young.

New managemant at Pocahontas coal mines.—The "Keystone Courier" of Connellsville, Pa., has the following in its issue of April 18th :

Henry Wickham, late manager of the Trotter works, has accepted the vice-presidency of the Southwest Virginia Improvement Co., and will at once assume the management of that concern. He expects to spend the most of his time in Virginia, but contemplates moving his family to Philadelphia in the course of a few months The greater part of the office work heretofore done in Philadelphia, will likely be transfered to Roanoke, Virginia. The company, whose daily output of coal amounted to about 1,300 tons prior to the recent calamitous explosion at its East mine, Pocahontas, and whose 200 coke ovens supply Lynchburg and Roanoke furnaces, owns 20,000 acres of a 12 foot vein of splendid steam coal which when coked makes an excelent furnace fuel. The company also owns a large body of ore lands. Mr. Wickham has been instructed by the owners of this property to spare no expense in shaping the Pocahontas mines to the entire satisfaction of the most fastidious miners in the matter of ventilation, and we doubt not that his reputation for having things right will soon be as well known to the miners of Virginia as it has been to those of the Connellsville region during the past ten or more years.

Burks Garden, in Virginia.—The peculiar topographical system of long narrow valleys, with streams flowing from their opposite ends to the middle, and thence at right angles across or through one of its boundary ridges, which is one of the striking features of the physical geography of the country surveyed by Mr. Morris Bien in the southern Apalachians (described in *Science*, No. 56), gradually changes, as it is traced north-eastward from the valley of East Tennessee, until in Tazewell county, the northern county of southwestern Virginia, is found the most southerly instance of a topographical feature common in Pennsylvania. This is Burks Garden, a beautiful oval valley, 8 miles long by 4½ miles wide. It is surrounded by a ridge averaging more than 1,200 feet in height. The valley contains some of the richest blue-grass land in the state. Its drainage forms one of the heads of Wolf creek, which affords numerous examples of sink hole drainage, so common in the area surveyed by Mr. Bien. This stream leaves the valley by flowing through the western side of the oval range in a deep and rugged gap, or canyon as it would be called in the west.—This valley well deserves the name of "garden," for it is one of the most beautiful spots in Virginia. The first glance recalls Johnson's description of the "Happy Valley" in Rasselas, and it is without doubt destined to become a popular mountain resort. It is located in the southern part of Tazewell county. Southeast of it is the valley of Holston river, in which there are large gypsum deposits. The fertility of Burks Garden may perhaps be due to the presence of gypsum. Elk Garden, in Russell county, southwest of Tazewell, is somewhat like Burks Garden, but not so well defined, although it may have been so in the past.—*Science*, No. 63.

Iron ores of Smyth county, Va.—A letter to "The Advance," of Lynchburg, contains this item : A Northern company, of which Dr. Brandredth is president, owns a fine body of mineral land near Marion, and it is reported that they will commence preparations soon to make steel rails We are all impatiently waiting for them to begin. The ore on their land is very fine. The material out of which the John B. Floyd gun was made came out of the bank that belongs to them.

Apiculture in West Virginia.—The following are the returns of the census of 1880 of the production of honey and beeswax, in pounds, by grand divisions and counties, in West Virginia, in 1879:

1. In The Valley.

Counties.	*Honey.*	*Wax.*
Jefferson,	15.097	77
Berkeley,	26,864	457
Total,	41,961	534

2. In Apalachia.

Counties.	*Honey.*	*Wax.*
Morgan,	5,355	227
Hampshire,	27,921	2,354
Mineral,	12,060	291
Hardy,	9,751	478
Grant,	8,562	769
Pendleton	16,550	762
Tucker,	8.195	414
Randolph,	22,047	1,288
Pocahontas,	13.500	1,050
Greenbrier,	24,670	632
Monroe,	15,253	736
Summers,	11.951	493
Mercer,	14,178	497
Total,	189,993	9,991

3. In Trans-Apalachia.

Counties.	*Honey.*	*Wax.*
Preston,	69,770	1,053
Monongalia,	8,705	727
Marion,	9,499	326
Taylor,	5,979	99
Harrison	15.896	231
Barbour,	14,749	384
Upshur,	11,384	324
Lewis,	17.040	354
Hancock	7,086	177
Brooke	10,417	15
Ohio,	11,725	154
Marshall	19,655	479
Wetzel,	8,488	388
Tyler,	4.816	145
Doddridge	9,303	382
Pleasants,	2,275	145
Wood	6.408	212
Ritchie	8,677	208
Wirt	6.023	341
Roane	15,441	298
Calhoun	7,539	50
Gilmer	10,607	177
Jackson	11,290	197
Mason	3.195	64
Putnam	5,647	101
Kanawha	27,894	376
Clay	9.289	849
Braxton	8.625	173
Webster	14,551	439
Nicholas	16,101	654
Fayette	20,088	710
Raleigh	24,405	669
Boone	57.526	1,787
Cabell	5,368	300
Lincoln	13,938	402
Logan	49.394	1,070
Wyoming	17,896	636
Wayne	19,655	481
McDowell	15,266	665
Total	601,610	16,142

Recapitulation.

	Honey.	*Wax.*
1. In The Valley	41,961	534
2. In Apalachia	189,993	9,991
3. In Trans-Apalachia	601,610	16,142
Totals	833,564	26,667

It appears from the above that 9 counties of West Virginia each produced over 20,000 pounds of honey. These, in the order of pounds produced, were: Preston, Boone, Logan, Kanawha, Berkeley, Greenbrier, Raleigh, Randolph, and Fayette. One of these was a Valley county, two were Apalachian ones, and six were Trans-Apalachian. The production in the whole state was about one and one-third pounds to the person, but in the 9 most productive counties, taken together, it was over two and one-half pounds to the person. In Preston and Raleigh it was over three pounds per capita; in Logan it was nearly 7, while in Boone it was over 9, making Boone really the leading county in the production of honey, as it was in the production of beeswax.

It is suggestive that six of these nine leading counties in apiculture, Boone, Logan, Raleigh, Greenbrier, Fayette and Kanawha should be adjoining ones; also that the 9 leading counties which contain only about one-fifth of the population of the state produced nearly one-third of its honey and wax.

West Virginia ranked 16th among the states in the production of honey and 18th in the production of wax in 1879. It produced about one-thirty-second part of the honey product of the United States.—The above statements suggest that it has special adaptations in some parts of it, large ones too, for this pleasant and highly profitable business.

Taxes on a mineral lease.—The supreme court of Pennsylvania has recently decided, in the case of Robb and others against the city of Scranton, that the holder of a mineral right who does not own the surface of the land containing the minerals is liable for separate taxes on such minerals. Parties in Lackawanna county, Pa., conveyed to others all the coal beneath the surface of a tract of land with the right to mine and remove the same, the minimum quantity to be raised or paid for, yearly, was fixed, but not the maximum. The lease was perpetual. The court held, in reversing the court below, that this conveyance, though nominally a lease, is in reality a sale of a portion of the land, such a severance of the surface from the underlying strata as to create a divided ownership in distinct portions. The case originated in a dispute as to which party should pay the taxes; the decision made both pay.

The Great Kanawha.—The coal, timber and iron interests of the Great Kanawha and its tributaries will soon be well advertised by maps and circulars in New York and elsewhere through Col. Thomas R. Sharp, receiver of the Ohio Central Railroad. The speedy completion of this road from Charleston to Gauley river will greatly expedite the development of the vast timber, coal, and iron interests on Elk, Gauley and Coal rivers. This movement of Col. Sharp is most gratifying to all interested in the growth of our valley.—*Kanawha Gazette.*

The Staunton Life Association of Virginia, a life insurance company organized in this city on the 10th day of April 1883, has, for the first year of its existence, had a most remarkable career of prosperity in the amount of business it has done in what may be called a country field, one already occupied by a somewhat similar company in the same city, and by its almost absolute immunity from losses by death; facts that show that the business of the company has been thoroughly well done, and especially that its medical examiners have been conscientious in the discharge of their duties, since upon them mainly rests the responsibility for securing a sound foundation for a life insurance company, and, for one organized like this, cheap and at the same time safe insurance.

The operations of this Virginia association show that it is worthy of all confidence. Below is a circular, dated Staunton Va., April 10th 1884, addressed to those insured in the company, that has elicited these remarks:

"During the last twelve month there has been so little communication between this office and the membership of the association that, of late, frequent inquiries have been made by members wishing to know whether they are in good standing; whether their names have not been accidentaly droped from the books or their addresses entered wrong, etc. It is to give a general answer to these questions, as well as to inform the members of the condition and progress of the association, that this circular letter is issued.

There has been only *one death* since the organization of the association, consequently only one occasion to call upon the members to pay an assessment. Rev. E. G. Vandiver of Lewisburg, W. Va., died of typhoid fever last September, and the amount of his policy was promptly paid, in full, to his widow. Since that time there have been no more deaths, although the membership has steadily and rapidly increased, until now, twelve months today from the issue of the first policy, we have the pleasure to report that the association has in force upon its books, as the result of its first year's work, insurance to the amount of *One and a half million dollars*. This is a record enjoyed by few companies which have preceded us upon the same field, a record which we may justly be proud of and upon which we congratulate you and each member of the association.

Our immunity from frequent losses speaks well for the care with which our risks have been selected, the skill of our medical examiners and the wise supervision of the medical director and executive committee, whose rejections have amounted to about $100,000. Our rapid increase in members is due, not only to the activity of our agents, but to the new and attractive features of the association, and the safe insurance offered, the public.

The first year's annual payments into the reserve fund, payable one year from the date of the issue of each policy, will shortly begin to fall due and it is hoped that members as they are notified will respond promptly.

Promising for ourselves and the other officers of the Staunton Life Association to use our best endeavors to make it a power for good in the land, and soliciting your earnest co-operation as we enter with bright promise upon our second year. We are, Very Respectfully,

Jno. Echols, President.

Hugh M. McIlhany, Secretary.

An intelligent opinion.—Mr. M. T. Scott, a leading and enterprising citizen of Bloomington, Illinois, who recently honored us with a call, and whom we induced to return to his home by way of the Chesapeake & Ohio Ry., writes us: "I enjoyed the daylight ride through to Louisville, Ky.; was much pleased with the route as a scenic one, and believe there is far more wealth in the mountains and hills of West Virginia and Eastern Kentucky than in all the Rocky Mountain region with its silver and gold ores; and then this is far more accessible to capital."—Mr. S. has been successfully engaged in silver and other mining operations in the Rocky Mountain region, and so writes knowingly when he makes this comparison of resources. We agree with our intelligent and carefully observing friend in his estimate of the wealth in and on the hills and mountains of the Virginias and Kentucky, and are perfectly satisfied, from what we have seen and from what has already been accomplished, that no portion of the Union now offers as great advantages as this for the safe and profitable investment of capital in a region easily accessible to the capitalist.

Virginia Iron Furnaces.—The *Iron Age* of April 14th, contains its usual quarterly report, one showing the condition of the blast furnaces of the U, S., April 1, 1884. The following table presents its figures for Virginia, West Virginia and the whole U. S.:

	Va.	W. Va.	U.S.
1. Charcoal furnaces.			
Number reported in blast	1	0	62
Capacity per week, tons	50	..	8,713
Number reported out of blast	30	6	185
Capacity per week, tons	1,480	625	16,654
2. Bituminous or Coke furnaces.			
Number reported in blast	5	5	100
Capacity per week, tons	2,091	2,410	49,236
Number reported out of blast	8	2	126
Capacity per week, tons	2,680	316	39,420

There are no anthracite using furnaces in the Virginias, but in the U. S. of such 107 are reported in blast, having a weekly capacity of 27,612 tons; and 121 out of blast having a weekly capacity of 26,605 tons.

The totals of the above show that of the 701 blast furnaces of all kinds, as reported, in the U. S., 269, with a weekly capacity of 85,561 tons, were in blast; and 432, with a weekly capacity of 82,679 tons, were out of blast April 1st. There has been but little change in coke or anthracite furnaces since Jan. 1st, three less being reported in blast, but in charcoal 16 fewer are reported in blast.

By the *Iron Age* reports the Virginia furnaces in blast Jan. 1, 1884, had a capacity of 3,156 tons; while those in blast April 1st had a capacity of but 2,141,—the difference is its allowance for Gem and Crozer furnaces that were both out of blast, for repairs. April 1, but were both in blast again by the middle of the month. The capacity of the West Virginia furnaces was reported as 2,480 tons Jan. 1, and 2,410 April 1.—For the full report of Jan. 1, see page 25 of this volume.

Of the Virginia coke using furnaces at this time, the middle of April: *Gem*, at Milnes, on Shenandoah Valley Ry., after repairs and the addition of two new Whitwell stoves, has just gone into blast with a good prospect for a largely increased production, probably near 90 tons a day. *Crozer*, at Roanoke, on Norfolk and Western Ry., after being out of blast a few weeks for relining, went into blast on the 16th, with a promise of a daily production of near 100 tons. *Low Moor*, on Chesapeake & Ohio Ry., is steadily producing about 115 tons daily. The two *Longdale* furnaces, near Chesapeake and Ohio Ry., are yielding their usual product of near 80 tons. *Callie*, near Ches. and Ohio Ry., is running with increased production. *Victoria*, also near Ches. & Ohio Ry., has just gone out of blast for a short time for much needed repairs to its lining. *Lynchburg* furnace has gone out of blast for repairs. *Wilton*, on Richmond and Alleghany Ry.,—the Princess furnace of Kentucky that has recently migrated to Virginia—will soon be ready to go into blast. Nearly all the Virginia charcoal furnaces are now idle.

The three dangerous mine gases.—Patrick Locks, one of the board of examiners appointed by the court in the Youngstown mine inspection, writes the "Courier" on the subject of gasses as follows: As gas has become a subject of wonder and intense excitement to many in our midst, I will give my fellow miners a brief explanation of the destructive element to which we are exposed. There are three kinds of gases discharged in mines, namely: carbonic acid gas, or black damp; white, or stone gas; and carbureted hydrogen gas. The latter is the one that blows miners into eternity. Carbonic acid gas, or black damp, is non-explosive, though unfit for respiration and a positive poison; it is one of the ingredients of after-damp, and is found to consist of 6 parts (by weight) of carbon united with 16 parts of oxygen. White gas is not explosive, though it would soon kill a person. This gas is found in blasting rock when powder has too much to do. Its proper name is sulphureted hydrogen. Carbureted hydrogen gas consists of 4 parts of hydrogen and 1 of carbon; it is a combustible only in oxygen or air. One foot of carbureted hydrogen gas requires a mixture of from five to seven feet of air to ignite it, but a mixture of fifteen or twenty feet of air will render it harmless.

As explosive gas is elastic, great precaution should be taken in mines that are not properly ventilated, particularly where there are old standing workings or falls. As gas is lighter than air it is always found in the highest point, and when the pressure of air that compresses it therein is reduced, the gas expands out of the strata, and from every hole in the roof, and every old fall, and overflows into the workings wherein it is compressed. This is the cause of mines producing more gas at one time than at another. The reason that explosive gas lies nearest the roof in mines is because it is lighter than air, two feet of gas weighing only a little more than one foot of air, the specific gravity of the atmospheric air being 1.000 and explosive gas 0.555. Carbonic acid gas, which miners call black damp, is heavier than air, which causes it to lay nearest the floor. One foot of black damp will weigh nearly as much as two feet of air, its specific gravity being 1.524. After-damp, or choke damp, is the damp left in mines after an explosion. It is lighter than black damp, and is formed of two parts of watery vapor, one of carbonic acid, and eight parts of nitrogen, the nitrogen being lighter than air, and therefore after-damp is much lighter than black damp.—*Keystone Courier.*

Analyses of Limestones.—Dr. Henry Froehling has favored *The Virginias* with the following new analyses of limestones from the line of the Richmond & Alleghany RR.

	No. 1.	No. 2.	No. 3.
Lime carbonate	54.833	96.786	92.857
Magnesia carbonate	33.524	0.642	1.362
Iron and alumina oxides	3.600	1.446	3.013
Silica	5.500	0.750	.....
Phosphoric acid	0.170	0.024	0.037
Organic matter	0.827	0.260	2.340
Water	1.240	.....	.....
	99.704	99.908	99.829

The samples analyzed were all dried at 212°.—*No 1* is of a sample of magnesian limestone from the property of Col. A. S. Buford near Manteo station R. & A. Ry.—*No. 2* is of a sample of limestone from J. L. Peak's quarry on the south side of James river at Eagle Rock station, R. & A. Ry., Botetourt county, Va.—*No. 3* is of a sample of limestone, representing an average of several car-loads, in transit to the Lynchburg furnace for flux, from Dillon's quarries at Indian Rock station, R. & A. Ry., Botetourt county, Va.

The traffic of the Guyandot river country, in kind, quantity and value, for the fiscal years 1880-81 and 1881-82, is well shown in the following tables from the reports of the Chief of engineers of U. S. army for the years 1881 and 1882.

Commercial statistics of Guyandot River, W. Va., for fiscal year 1880-81.

Articles.	Quantity.	Price.	Value.
550 poplar rafts	1,750,000 cu. ft.	12 cts. per ft.	$210,000
350 oak rafts	400,000 lin. ft.	25 cts. per ft.	100,000
75 walnut rafts	150,000 cu. ft.	50 cts. per ft.	75,000
Oak staves	7,000,000	$15 per thous.	105,000
Tan bark	2,000 cords.	$12 per cord	24,000
Hoop poles	200,000	$12 per thous.	2,400
Lumber, sawed	200,000 b. m. ft.	$15 per thous.	3,000
Wool	15,000 lbs.	40 cts. per lb.	6,000
Feathers	5,000 lbs.	50 cts. per lb.	2,500
Ginseng, dried	12,000 lbs.	$2 per lb.	24,000
Wheat	10,000 bush.	85 cts. per bush.	8,500
Corn	20,000 bush.	40 cts. per bush.	8,000
Rye	1,000 bush.	60 cts. per bush.	600
Oats	10 000 bush.	40 cts. per bush.	4,000
Potatoes	2,000 bush.	50 cts. per bush.	1,000
Apples	2,000 bbls.	$1.25 per bbl.	2,500
Peaches & apples, dried,	2,000 bush.	$1 per bush.	2,000
Tobacco	25,000 lbs.	7 cts. per lb.	1,750
Butter and eggs			10,000
Exports, value			$590,250
Imports, value			300,000
Total value of exports and imports			$890,250

Commercial statistics of Guyandot River, W. Va. for fiscal year 1881-82.

Articles.	Quantity.	Price.	Value.
750 poplar rafts	2,250,000 cu. ft.	12 cts. per ft.	$270,000
350 oak rafts	400,000 lin. ft.	25 cts. per ft.	100,000
110 walnut rafts	200,000 cu. ft.	50 cts. per ft.	100,000
Oak staves	7,000,000	$15 per thous.	105,000
Tan bark	2,000 cords,	$12 per cord.	24,000
Hoop poles	200,000	$12 per thous.	2,400
Lumber, sawed	200,000 b. m. ft.	$15 per thous.	3,000
Wool	15,000 lbs.	40 cts. per lb.	6,000
Feathers	5,000 lbs.	50 cts. per lb.	2,500
Ginseng, dried	12,000 lbs.	$2 per lb.	24,000
Wheat	10,000 bush.	85 cts. per bush.	8,500
Corn	20,000 bush.	40 cts. per bush.	8,000
Rye	1,000 bush.	60 cts. per bush.	600
Oats	10,000 bush.	40 cts. per bush.	4,000
Potatoes (Irish)	2,000 bush.	50 cts. per bush.	1,000
Apples	2,000 bbls.	$1.25 per bbl.	2,500
Peaches & apples, dried,	2,000 bush.	$1 per bush.	2,000
Tobacco	25,000 lbs.	7 cts. per lb.	1,750
Butter and eggs			10,000
Exports, value of			$675,250
Imports, " "			300,000
Total value of exports and imports			$975,250

Guy Run Iron lands.—Prof. B. Silliman of New Haven, Conn., makes inquiries concerning the Guy Run iron lands belonging to Mr. E. A. Packer of New York city, situate adjoining those of the Iron and Steel Association of Virginia (Victoria furnace), and near the Chesapeake & Ohio Ry., at Goshen, Va.—This is one of the largest and most valuable tracts of iron ore land in Virginia; it also has on it several valuable water-powers and excelent furnace sites. We hope some of our energetic Northern iron-masters will buy and improve this great property.

A List of Virginia Minerals.—Under the heading of "Ores, minerals, and mineral substances of industrial importance, which are at present mined," in the report of the "Mineral resources of the U. S. by Albert Williams, Jr., chief of division of mining statistics and technology," of the U. S. Geological survey, is the following list for Virginia, reported by Prof. John C. Smock of New Brunswick, N. J.—The mineralogical names are given first, in italics, followed by the common names of the same mineral, in parentheses. As published in Williams' report there are numerous errors in Virginia names and locations; these are corrected here. Comments will follow.

Asbestus, (Asbestus).—Found at Barton's and Singer's, Floyd county; near northern copper lode, Grayson county; on Little river below Hampton mine, lead and zinc mines, Painter's branch, Wythe county; Barnett's Mills, Fauquier county; Pittsylvania county; Goochland county; Willis mountain, Buckingham county; Chula, Amelia county; near Appomattox river, Amelia county, and near Franklin C. H.

Barite, (Barytes, heavy spar).—Found at Fry's marble quarry, Wytheville, Wythe county, in small quantities; Brown hill, Wythe county, near lead and zinc ore deposits, in large masses; near Marion, Smyth county, mined in Silurian limestone; Cavitt creek and Baptist valleys, Tazewell county; Russell county, along Clinch river; Lee county; Eldridge's gold mines, Buckingham county; near Lexington, Rockbridge county; several localities near Lynchburg, Bedford county; Beaver creek, Campbell county, bed of fine granular variety; near St. Stephen's, and in lower Fauquier county. several mines, no longer worked; between Marshallville and Upperville, Fauquier county, undeveloped; and Prince William county, mines worked out.

Calamine, (Silicate of zinc).—Found at Wythe county lead mines, with galena, blende, etc.

Cerussite, (White lead ore, carbonate of lead).—Found at Wythe lead mines, Austinville, Wythe county, with galena, blende, etc., in magnesian limestone in small quantities; Quesinbury and Kitchen mine, Wythe county.

Chalcocite, (Copper glance, sulphuret of copper).—Found near Max Meadows, Wythe county; Mount Airy, Smyth county; Toncray mine, Floyd county, with magnetite and pyrite, not worked; copper ranges or lodes in Carroll county, opened at several localities, west and northwest of Hillsville; occurs in upper parts of deposits with melaconite and chalcopyrite.

Chalcopyrite, (Copper pyrites, yellow copper ore),—Found at Toncray mine, Floyd county, with chalcocite, pyrite, and magnetite; northeast part of Floyd county; on north fork of Roanoke, with pyrrhotite; Peach bottom copper lode, or range, Carroll county; northern copper range, at Great outburst; Chestnut creek, Copperas hill, Cranberry plains, and other localities. Continued southwest into Grayson county. Too far from cheap transportation. Several mines opened. Common at many localities in the "gold belt." Phoenix copper mine, Fauquier county; Ford's mine Buckingham county; gangue in gold mine; mine near Herndon, Fairfax county; Madison county; Fairfax gap; head of Naked run, Greene county; Guilford, Loudoun county; Richards mine, Page county.

Coal, (Coal, bituminous coal).—Coal measures in Buchanan, Dickenson, Wise, Scott, Lee, Russell, and Tazewell, in southwest angle of state; in edge of Cumberland mountain range; sub-carboniferous or great conglomerate coal group, in Wythe, Montgomery, Pulaski, Augusta, and Botetourt, on west side of the great valley. Upper New river coal series opened in mines near Blacksburg, Brush mountain, and on Price mountain, Montgomery county; near Martin's in Pulaski county, and in Little Walker mountain in Wythe and Pulaski counties. A semi-bituminous coal is opened at Max Meadows and Clark Summit mine, in Pulaski county; in Bland county, mines on south foot of Brushy mountain. In Tazewell county, at Middle creek, Horsepen cove, and Abb valley; in Buchanan county, on Connoway creek; in Wise county, near Big Stone gap; and on head waters of Powell river, Green river, and Pond run, bituminous, splint, and cannel coals.

Coal, 2 (Bituminous coal).—Jura-Triassic coals. — Richmond coal basin, 189 square miles, in Chesterfield, Powhatan, and Henrico counties, with mine centres at Midlothian, National, Clover hill, Carbon hill, and Dover. Three workable seams and 50 to 60 feet of coal. Farmville coal basin, on the Appomattox river, and in Cumberland and Prince Edward counties, 25 square miles; mines at Farmville.

Dan river basin, Pittsylvania and Henry counties, crossing into North Carolina. Several thin seams exploited.

Cuprite, (Red oxide of copper).—Found at Linden, Warren county, with melaconite and native copper.

Flaging stone — Slate quarried on Hunt creek, Buckingham county.

Galenite, (Galena, sulphide of lead).—Wythe county lead mines; occurs with blende, smithsonite, and calamine in magnesian limestone; worked for a century; Bertha zinc mine, eastern part of Wythe county, with blende; Little Reed Island creek (Sayers), Wythe county; Forney mine, Wythe county, with blende; New river, near mouth of Reed Island creek, Pulaski county, galena and blende, with other lead and zinc minerals; Tract mountain and Big Walker mountain, Pulaski county; Sugar Grove, South Fork valley Rich valley, Bear creek, localities in Smyth county; Giles county, in lower Helderberg rock. in small quantities; near Sharon, in Bland county, also in Garden and Flat Top mountains; on Clinch river, near mouth of Maiden Spring fork, Russell county; Floyd county, at McAlexander's, on Little river, and in this range with quartz and pyrites, argentiferous; Peach Bottom copper lode, Carroll county and Grayson county, argentiferous; Stafford, Nelson and Franklin counties, argentiferous.

Gold, (Gold).—Found on Brush creek, Montgomery county, in gravel; Little River, Floyd county; "gold belt" of Virginia from Potomac to Halifax county, 200 miles long and 15 to 25 miles wide, gold-bearing quartz in crystaline rocks, many mines opened, principally in Fauquier, Stafford, Culpeper, Spotsylvania, Orange, Louisa, Fluvanna, and Buckingham counties; Booker mine, Buckingham county, Rappahannock mine, Randolph mine, Whitehall mines, Pocahontas mine at Andrews in Spotsylvania county; Louisa county mines; Chicago and Virginia Gold Mining Company, Orange county; Snead mine, Fluvanna county; Tellurian gold mine, Goochland and Fluvanna counties; eastern part of Culpeper county, several working localities; Culpeper gold mine, Culpeper county; Eagle mine, Stafford county; Franklin, Liberty, and other mines in Fauquier county, southern part, lately reopened, and worked very little, gold in sulphurets, lost in roasting.

Granite.—Found at Richmond, Petersburg, Fredericksburg, gray granite; Richmond, Henrico county; Tuckahoe district, Henrico county; Westham granite quarries, Manchester; Old Dominion quarry at Granite, Chesterfield county; Namozine district, Dinwiddie county; Lynchburg, Campbell county; Columbia, on James river (a gneiss), Fluvanna county; Willis mountain, Buckingham county, (a pink gneiss); Cumberland county, quarries in gneiss; Boorman, on Cedar run, in Fauquier county, quarry worked

for Washington supply; also near Delaplane, Fauquier county.

Gypsum—Buena Vista plaster beds, Buchanan's plaster cove, and other localities in North fork of Holston valley, Smyth county, and Washington county; extensive beds, associated in places with rock salt.

Halite, (Common salt).— I. Rock salt, Saltville, Smyth county, valley of North fork of Holston river, a large deposit; II. Brines, Saltville, Smyth county and Washington county; on Clinch river, southwest part of Lee county.

Hematite, (Red hematite, specular iron ore).—Found in lower slates of Potsdam, in Warren, Augusta, Rockbridge, Botetourt, Bedford, Wythe, and Smyth counties. Beds opened at Overall station, Warren county; Arcadia furnace, Botetourt county; Pollard cut, same county; specular ore at Cundiff creek in Bedford county, and on Clinch mountain range, Washington county; also on south slope of Iron mountain, Grayson county; on James river, below Lynchburg. Traceable through Nelson, Amherst, Appomattox, Buckingham, Albemarle, Orange, and Culpeper counties; several mines opened near James river. Loudoun county; Stafford county; east foot of Bull Run mountain, Prince William county.

Hematite, 2 (Fossil ore, dyestone ore).—Found on south flank of Big Walker mountain, Wythe county; same range and also on Poor Valley ridge and Clinch mountain; in Flat Top, Buckhorn and East river mountains, in Giles county; same ranges in Bland county, and also at Wolf Creek and Round mountains; in Tazewell county; Russell county; Powell mountain, and south face of Clinch mountain, Scott county; Poor Valley ridge, Walden ridge, and Powell mountain, in Lee and Wise counties. Numerous ore banks in red hematite worked in Great Valley of Virginia from Augusta to Smyth county.

Hydraulic limestone.—Found at Balcony Falls, James river Rockbridge county. A gray magnesian stone, the noted "Balcony Falls cement"; Madison run, Orange county, undeveloped.

Limestone—Found in Valley of Virginia and Piedmont district. Outcrops at many localities; for local uses mainly. Fauquier county, local use.

Limonite, (Brown hematite).—Occurs in Potsdam sandstone, in Page, Rockingham, Augusta, Rockbridge, Botetourt, Montgomery, Pulaski, Wythe and Smyth counties; many deposits along western foot of Blue Ridge.

In magnesian limestone of Great Valley in counties above enumerated; also in Oriskany sandstone, mainly in Pulaski and Giles counties.

Ore banks in many localities in this Valley quite to the Tennessee line.

Limonite in extensive beds opened in Oriskany and Upper Helderberg formations, in Paint Lick mountain, Rich mountain, Nye cove, and other localities in Tazewell county; in Clinch mountain and Kent ridge, in Russell county; in Powell mountain, Clinch mountain, Fossil and Big ridges, in Scott county; Bowling Green forge, Lee county. Large deposits with belts of magnetite and specular ore occur in a range near James river in Nelson, Amherst, Campbell, Appomattox, Buckingham, thence northeast into Fluvanna, Orange and Culpeper, and terminating in Fauquier. Many openings on this range.

Limonite, 2 (Bog iron ore).—Found in Tidewater part of state, in Tertiary formation; ores generally lean.

Magnetite, (Magnetic iron ore).—In Great Valley of Virginia at Ripplemead mine near Pearisburg; also near Newport, and other localities, Giles county; Wytheville, Wythe county, with hematite; near Abingdon, Washington county; Toncray mine, Hylton mine, and Bear beds, in Floyd county; Carroll county, Billings mine, near Independence, thence to New river, in Grayson county; several localities, James river belt; Mount Athos, Riverville, Appomattox county, with belts of specular and limonite ores; also in Buckingham, Culpeper; near Paris and Markham, in Fauquier and Spotsylvania counties; Stewart knob, Patrick county; Rocky mountain, Franklin county; Albemarle county; in Chesterfield coal basin, at Tarbue's.

Marl, (Green sand marl).—Found in Lower Tertiary or Eocene near head of tidal waters, (average 16 miles wide). Green sand marls, principally in Prince George, Henrico, Hanover and King William counties.

Calcareous marls.—Found in Middle Tertiary or Miocene, of Tidewater area of state. Localities: Gloucester county, New Kent county; on Aquia creek, Stafford county.

Melaconite, (Black oxide of copper).—Found in upper portions of copper lodes, Carroll county, with chalcocite and chalcopyrite, and malachite; worked for a time; also Floyd and Grayson counties; Linden, Warren county.

Millstone.—Found at Price's Mills, Montgomery county; southern part of Carroll county, granites used for millstones; Campbell county, syenitic rock used for millstones.

Malachite, (Green copper ore, carbonate of copper).—Found in Peach bottom copper range, Carroll county; northern copper lode, or range, Carroll county, with limonite and ores of copper; near Overall station, Warren county, with gray sulphide; near Catlett station, Fauquier county; old mine near Linden, in Fauquier county, formerly worked.

Marble.—Found near Wytheville, Wythe county; Frye hill, southwest of Wytheville, Wythe county, quarries at these localities; Craigsville, Augusta county, encrinal marble and black marble from Lower Helderberg formation extensively quarried; Campbell county; near Marion, Smyth county; valley of North fork of Holston river, Washington county; Giles county, (Rye hollow), etc.; Estillville, Scott county; in Rockbridge county; in Blue Ridge, Fauquier county; Toddsburg, near Madison run, Orange county. Brecciated or Potomac marble, quarried near Leesburg, Loudoun county, also in Fauquier county.

Ocher.—Found at Keezletown, Rockingham county, near Massanutton mountain; near Alma and Marksville, Page county; Bermuda Hundred, on Appomattox river; Bon Air, Chesterfield county; with hematites near Madison Run Orange county.

Psilomelane (Manganese ore), found at Crimora, with pyrolusite, worked.

Pyrite (Iron pyrites), common in many localities. Graham's, New river, Wythe county, with brown hematite outcrop; disseminated in proto-Carboniferous slates, Smyth county: Brush creek, Montgomery county; Floyd county, Toncray mine with copper sulphurets; southern copper lode, northern or Dalton lode in Carroll county, immense deposits of pyrite, pyrrhotite, arsenopyrite, and chalcopyrite, underlying gossan and the deposits of melaconite and chalcocite; Grayson county, southeast corner of county in copper lodes with pyrrhotite and chalcopyrite. Western part of Grayson county in east slope of Balsam (Mt. Rogers) and White-top mountains. Many localities in "gold belt" and often auriferous, particularly in Amherst and Buckingham counties. Large deposit at Tolersville, Louisa county, occurs in chloritic slates.

Pyrolusite (Black oxide of manganese), found at Crimora manganese mine, Augusta county, extensive deposit and worked steadily; Iron mountain, Wythe county; Glade ore bank near Max Meadows, Wythe county, associated with

iron ore; Lick and Draper mountain ranges, Wythe county; Flat-top mountain near Bland county line; Salt Pond mountain, Big Stony creek, Giles county; mountains westward part of Bland county; Whitelow and Shooting creek, Floyd county; near Vesuvius furnace, Rockbridge county; on James river, in Campbell and Appomattox counties; Cabell mine; Pittsylvania county, mined largely; Tolersville, Louisa county; Midway Mills, (Dan's mine), Nelson county.

Sandstone, (Brown stone), quarries in Triassic sandstone areas of middle Virginia; freestone quarries near mouth of Aquia creek; near Manassas, Prince William county, a brownstone of Triassic extensively used in Washington and Alexandria and elsewhere; Thoroughfare gap, Prince William county, a quartzite.

Serpentine, found between Difficult creek and Stillhouse creek, near the Potomac, Fairfax county, heavy beds and containing chrome ore and talc and magnetite.

Slate, for roofing; on Hunt creek, Buckingham county, several quarries actively worked, and for a long time; Albemarle county; Baldwin quarry, Amherst county; near James River, Bedford county, and near Balcony Falls; near Staunton, Augusta county; Newcastle, Craig county, opened; Keswick, Albemarle county; near Rappahanock river; near White Sulphur Springs, Fauquier county, abandoned.

Smithsonite (Carbonate of zinc, "dry bone"), found in Wythe county lead and zinc mines with blende, galena, etc.

Sphalerite (Zincblende, black jack), found at Austinville, Wythe county, lead and zinc mine; occurs with galena and other ores of lead and zinc, in dolomite; has been long and largely worked; Bertha mine, Wythe county; Falling Cliff mine, Wythe county, and Forney's, Wythe county; on New River, near mouth of Reed Island creek, Pulaski county, with galena; near Sharon and on Garden and Flat-top mountains, Bland county, scattered in dolomite.

Talc (Steatite, soapstone), found at Barton's, Floyd county; near Toncray mine, Floyd county; near Peach Bottom mountains, on north, Grayson county, in great masses; Wytheville, Wythe county; two miles west of Lynchburg, Campbell county, belt traceable for miles; near Amelia C. H., Amelia county; Spencer's store, Henry county, fine quarries; Vallena, Fluvanna county; Madison county; northwest base of Buffalo ridge, Amherst county, and Nelson county, small quarries opened; near Cartersville, Cumberland county, opened; Dranesville, near Potomac, Fairfax county, with serpentine.

Ores, minerals, and mineral substances of industrial importance and known occurence, but which are not at present mined.

Arsenopyrite (Mispickel, arsenical iron pyrites), found in Purgatory, Floyd county, large vein, argentiferous; southern copper lode in Carroll and Grayson counties.

Bornite (Purple copper ore), found near Leesburg, Loudoun county.

Carbonite (Natural coke), found in Chesterfield coal basin, Chesterfield county (Triassic).

Chromite (Chrome iron ore), found in serpertine, Dranesville, near the Potomac, in Fairfax county.

Copper, native, found in Toncray mines, Floyd county; native copper lode, Carroll county, near Hillsville, etc., near Linden, Warren county, with cuprite and melanconite.

Dufrenite, (Phosphate of iron), found on South mountain, ten miles east of Lexington, Rockbridge county.

Feldspar, common in middle Virginia.

Fire-clay, found under coal seams in southwest angle of state, undeveloped. Lick mountain, Wythe county; Bon Air, Chesterfield county; near Court House, Powhatan county; also in counties of Cumberland, Buckingham, and Appomattox; near mouth of North river, Rockbridge county; Madison run, Orange county.

Graphite (Plumbago, black lead), found at Winterham, Amelia county; Halifax county and Goochland county.

Kaolin (Clay).—Found in Augusta county; Prince Edward county; near Cumberland Court house, Cumberland county, a belt of clay; Kaolin or Sherando station, Augusta county; near Warrenton, Fauquier county, undeveloped; Stafford county; Lick mountain, Wythe county, in large quantities; near Rye valley, Smyth county.

Muscovite (Mica).—Found in Hanover county; near Court-house, Goochland county; Louisa county; near New London, Bedford county; near Amelia Court-house, Amelia county.

Massicot (Lead ocher)—Found at Austin mines, Wythe county, in small quantities with galena and other lead ores.

Pyrrhotite (Magnetic pyrites).—Found in northeast part of Floyd county, with chalcopyrite; a thick bed; southern copper lode, and Northern or Dalton copper lode, Carroll county. Deposits of great extent, with pyrite, chalcopyrite, and arsenopyrite. Opened at Clifton mine, near Chestnut creek, Cranberry plains, etc., Carroll county. Extends southeast into Grayson county. Distant from transportation.

Quartz (Quartz, sand).—Quartzite near Leesville, Bedford county; Thoroughfare gap, Prince William county. Sand, for glass-making, near Greenville, Augusta county.

Silver (Silver).—See under Galenite and Arsenopyrite Occurs alloyed with gold in gold-bearing rocks of central part of state.

Sulphur (Sulphur).—Found on Potomac, 25 miles above Washington, in small masses in limestone.

Tetradymite (Tellur-bismuth).—Found at Whitehall gold mine, Spotsylvania county; Monroe mine, Stafford county; Tellurium mine, Fluvanna county; Stafford county.

Tripolite (Infusorial earth).—An extensive deposit traceable from the Patuxent river, in Maryland, to the Meherrin, in Virginia. Exposed at Richmond and other points.

Umber.—Found at Overall station, Warren county.

A List of West Virginia Minerals (From same report.) —*Coal* (Bituminous coal). Carboniferous formation has an area of 16,000 square miles. Lower coal measures and subconglomerate seams are worked in the southern part of the state; in northeast the Upper coal measures afford the working seams. Potomac basin, opened in Mineral and Grant counties; Preston county basin worked at Newburg, Austin, and Decker creek, Monongalia county; Bluestone Flat-top coal field, extensively worked in places, extends into Mercer, Raleigh, and Summers counties. In Randolph, Upshur, and Marion counties the Upper Freeport seam is thick, and worked in last named largely. The Great Kanawha basin is noted for its various seams of bituminous, splint and cannel coals. Nowhere are the Lower coal measures better developed than in it. Cannelton, Fayette county, Peytona, Boone county, afford "cannel splint." The "splint" coals are found in Braxton, Webster, Clay, Nicholas, Fayette, Kanawha, Boone, Logan, Lincoln, and Wayne counties, often with more or less bituminous coals. Mines of splint coal at Coalburg, East bank, and Paint creek, in Kanawha county. Principal mining districts are along the Ohio river, valley of Kanawha, and along lines of Baltimore & Ohio Railroad from Preston county west to the Ohio river.

Coal (2) (Anthracite coal), found in Berkeley county, thin seams worked for local use only.

Fire clay, found at Nusum's mills in Monroe county. Used for fire brick. Lost run, Taylor county, Tunnelton, Preston county; on Two-mile creek of Elk river, Kanawha county, worked; near Cassville, in Wayne county; near Savageville, in Braxton county; Hancock county. Several firms make fire brick. Other localities in coal measures.

Halite (Common salt,brines). Brine wells. Principal points are: Charleston, Kanawha county; West Columbia to Hartford, on Ohio river, Mason county; Bulltown,on Little Kanawha, Braxton county; Louisa, on Big Sandy river, Wayne county; New river, Mercer county; Birch, on Elk creek; mouth of Otter creek, on Elk river, Clay county; Cheat river, Decker creek, and Scott run, Monongalia county, in boring for oil. Mason county salt works most extensive, and make nearly all of state product.

Hematite, (Fossil ore), found on north slope of East River mountain, Bluestone river on Black Oak mountain,and Flattop mountain, Mercer county; Little mountain, Monroe county; Anthony creek, and Howard creek, Greenbrier county, both fossil and black ore; South fork mountain, Pendleton county: Middle and also on North mountain ranges, Hardy county large bodies developed; vicinity of Greenland Gap, Grant county, five feet thick, parallel seams.

Hydraulic limestone, (Water lime), found near Shepherdstown, Jefferson county, quarry in bluff on Potomac.

Limonite, (Brown hematite), found near court house, Raleigh county; Peters mountain, Monroe county; South fork mountain and near Franklin, Pendleton county, with fossil ores; Salt Spring Run knob, Cunningham tract, south of Moorefield, Hardy county, large deposits. North or Capon mountain, Hardy county, have long been mined, associated with red hematites; Walker ridge and Knobly mountain, Grant county; Bloomary, Capon mountain, Hampshire county, long worked; Sandy ridge, Morgan county; Martinsburg, Berkeley county; along Potomac, opposite Antietam creek, Jefferson county; near Bolivar heights, Harper's Ferry; Maltby's ore bank, Jefferson county. Some of these localities are not now worked.

Niter (Saltpeter "peterdirt"), Caves in Greenbrier county; Monroe and Pocahontas counties.

Petroleum, (Petroleum), found at Horse neck, Pleasant county; Crow creek, and French creek, Pleasants county: Oil rock and California house, Ritchie county; Volcano and Sandhill "heavy oils." Burning Springs, Wirt county; near Morgantown, Monongalia county, and at points on a line thence to Charleston, Kanawha county.

Quartz (Sand), found at Sandy ridge, at Alpines, Morgan county. large deposit of white sand, worked for glass manufacture in Philadelphia.

Sandstone.—Near Morgantown, Monongalia county, (Mahoning) sandstone is quarried; Grafton sandstone is quarried in Taylor county; Weston ,Lewis county; Ronceverte, Greenbrier county; Charleston, in Kanawha county. Mahoning sandstone is extensively quarried for local use. Upper Kanawha sandstones of coal measures are quarried; Hansford, on Kanawha river, Kanawha county; near Kanawha on Elk river, Kanawha county; East Wheeling, Ohio county.

Siderite, (Carbonate of iron, clay iron stone), found in Mineral county and Grant county, thin seams at several localities; Three Forks creek, Reedsville, Tunnelton, and Muddy creek, Preston county; Decker creek, Scott run, Booth creek, and Cheat river, east part of Monongalia county; Fairmont, Marion county; near mouth of Lost run, Taylor county; near Philippi, Barbour county; Standing Rock run, worked by Elk Railroad Iron Company; Clay county, Braxton county; near Charleston, Kanawha county; on Big Sandy river, at Cassville, Wayne county, eight seams one to three feet thick. Workable beds in Lower coal measures, and Lower barren measures.

Siderite (2) (Black band ore). Black band iron ore, near Big Sandy river, Wayne county; Davis and Briar creeks, Kanawha county; Bell creek, Fayette county; Little Elk run, Nicholas county; Little Sycamore creek of Elk river, Clay county.

Barite, (Barytes, heavy spar), found in Jefferson county; Mercer county, on north slope of East river mountain.

Calcareous tufa, Travertine, calcareous marl, found on Patterson creek, Grant county; Hardy county, Hampshire county, and other counties in large deposits; Jefferson county.

Fluorite, (Fluorspar), found at Shepherdstown, Jefferson county.

Grahamite (Asphalt), found filling fissures in sandstone (Carboniferous) near Cairo, in Ritchie county. Has been worked.

Limestone, found in Jefferson and Berkeley counties.

Manganese ore, found on Anthony creek, Greenbrier county.

Ocher, (Yellow ocher),near Weston, Lewis county; South Branch valley, Hardy county; Lost river; near Harper's Ferry, Jefferson county; near Shepherdstown, Jefferson county; Cline's cross roads, Pendleton county; on Guyandot river, Cabell county; near Ceredo, Wayne county.

Quartz, (Sand), found at Blue gap, Short mountain, Hampshire county, cliffs of white sand rock; near Morgantown, Monongalia county, very soft sandstone; Sir John run in Morgan county.

West Virginia Coke and Coal.—Stagnation in the iron business during the past years has had only this effect, apparently, upon the New River coke-producing region, that further development was for a time arrested. But about 500 coke ovens are now in blast, including the 80 ovens at Hawksnest, which were stoped by an accident about a year ago, but have recently been providing coke for the great Victoria furnace at Goshen. Now, with prospect of reduced production and larger cost in the Connellsville region, new developments are in progress again on the New River. At Beury, Cooper & Co.'s mine men are laying sixty beehive ovens; the output of coal is 4,000 tons a month, and the miners receive 45 cents a ton. At some other mines in the region 50 cents is paid. At the Gauley mountain, also, a different coal seam has been opened, nine feet thick, where 100 men are now employed. Improvements are in progress at Nuttall's mine No. 1, where fifty-three coke ovens are at work. The Low Moor iron-works are supplied from the New River mines, and the Longdale furnaces have their own ovens, while furnaces at Ironton, Ohio, still use fuel from this region, and the use of it at various manufacturing points in the West is steadily increasing.—*Wheeling Register.*

Shenandoah Iron, etc. Co.—George S. Eyster, analytical chemist, of Gettysburg, Pa., has been engaged for some months at Milnes, Va., on Shenandoah Valley RR., making analyses of ores, limestones, pig iron, and blooms for the Shenandoah Iron etc., Co. We hope to have some of the interesting results of his work, of which he has informed us, for publication. The pig and bar iron and blooms, made at the furnaces and forges of this company have always had a most excelent reputation.

Apiculture in Virginia.—In the complete reports of the U. S. census for 1880 are the following returns of the production, in pounds, of honey and beeswax in Virginia, by counties and grand divisions, during the year 1879:

1. Tidewater.

Counties.	*Honey.*	*Wax.*
King George	3,579	152
Westmoreland	1,951	69
Richmond	1,687	110
Northumberland	3,720	33
Lancaster	256	5
Essex	5,030	883
Middlesex	777	124
King-and-Queen	1.813	116
Mathews	560	39
Gloucester	5,543	391
Caroline	12.498	411
King William	7,296	370
Hanover	4,402	218
New-Kent	790	13
James City	1,194	16
York	490	26
Warwick	8	6
Elizabeth City	403	20
Henrico	6,601	1,010
Charles City	577	15
Prince George	3,147	144
Surry	810	79
Sussex	2,400	302
Southampton	11,057	531
Isle-of-Wight	2,910	371
Nansemond	5,916	538
Norfolk	5,628	556
Princess-Anne	1,108	128
Accomac	3,034	367
Northampton	240	31
Totals	91,945	7,072

2. Midland.

Counties.	*Honey.*	*Wax.*
Alexandria	965	20
Fairfax	9,438	248
Prince-William	11,482	806
Stafford	4,773	26
Spotsylvania	3,704	247
Louisa	7,111	341
Fluvanna	4,810	60
Goochland	3,495	182
Buckingham	4,213	461
Cumberland	4,776	147
Powhatan	4,782	124
Chesterfield	3,637	163
Appomattox	8,641	555
Prince Edward	3,351	113
Amelia	8,396	573
Dinwiddie	4,053	215
Nottoway	6,396	383
Lunenburg	4,358	439
Brunswick	1,797	143
Greensville	2,341	323
Campbell	28,326	927
Charlotte	9,104	758
Pittsylvania	26.523	3,250
Halifax	20,663	2,670
Mecklenburg	10,736	998
Totals	197,871	14,172

3. Piedmont.

Counties.	*Honey.*	*Wax.*
Loudoun	35,818	999
Fauquier	29,654	620
Culpeper	8,402	472
Rappahannock	19,574	355
Madison	5,611	253
Greene	2,040	69
Orange	4,422	75
Albemarle	21,794	584
Nelson	7,258	440
Amherst	16,953	596
Bedford	25,374	1,603
Franklin	11,159	1,864
Henry	8,599	1,138
Patrick	15,215	2,032
Totals	201,873	11,100

4. Blue Ridge.

Counties.	*Honey.*	*Wax.*
Floyd	8,927	576
Carroll	42,925	994
Grayson	20,270	738
Totals	72,122	2,308

5. The Valley.

Counties.	*Honey.*	*Wax.*
Frederick,	26,910	443
Clark,	14,505	808
Warren,	13,148	306
Shenandoah,	18,105	362
Page,	6,358	250
Rockingham,	20,411	361
Augusta,	13,754	624
Rockbridge,	11,517	674
Botetourt,	8,719	576
Roanoke,	5,144	330
Montgomery,	12,146	231
Pulaski,	7,477	363
Wythe,	8,385	233
Smyth,	20,498	655
Washington,	44,903	1,183
Totals,	231,980	7,399

6. Apalachia.

Counties.	*Honey.*	*Wax.*
Highland	8,931	237
Bath,	6,664	166
Alleghany,	920	29
Craig	4,985	193
Giles,	12,602	548
Bland,	8,489	335
Tazewell,	15,919	896
Russell,	49,409	1,941
Scott,	58.727	1,709
Lee,	70,132	3,324
Totals,	236,778	9,378

7. Trans-Apalachia.

Counties.	*Honey.*	*Wax.*
Buchanan,	24.219	870
Dickenson,	.....	....
Wise,	20,183	899
Totals,	44,402	1,769

Dickenson is included in Buchanan and Wise.

Recapitulation.

Grand Divisions.	*Honey.*	*Wax.*
Tidewater.....	95.425	7.074
Midland,.....	197,871	14,172
Piedmont,...	211,873	11,100
Blue Ridge, ...	72,122	2.308
The Valley,.....	231,980	7,399
Apalachia.....	236,778	9.378
Trans-Apalachia.....	44,402	1,769
Grand total,.....	1,090,451	53,200

It appears from the preceding table that there were 18 counties in Virginia, in 1879, that each produced over 20,000 pounds of honey ; two of these were in Midland, 4 in Piedmont, 2 in the Blue Ridge, 4 in the Valley, 3 in Apalachia, and 2 in Trans-Apalachia. The three leading counties were Lee, Scott and Russell, three adjoining ones in the Tennessee basin of Apalachia. The fourth was Bedford, in Piedmont ; the fifth Carroll, on the Blue Ridge ; and the sixth and seventh were Loudoun and Fauquier in Piedmont.

In proportion to area the Blue Ridge grand division was the most productive ; next came Apalachia, then The Valley, Piedmont, Midland and Tidewater.

In Lee county, the leading one in quantity, the production was 4⅔ pounds per capita. That county is especially well located for apiculture, sheltered by the Cumberland mountain and facing southwestward, as do also Scott and Russell ; the production in the whole state was about ⅔ of a pound to the person.

Errata.—The footings of honey in Tidewater and Piedmont, and that of wax in Tidewater, are wrong on the preceding page but correct above.

The Natural Bridge of Virginia in 1782.

Among the officers of the French army that aided in achieving the independence of the American colonies of of Great Britain in the Revolutionary war, one of the most noted was the Marquis de Chastellux, a Major General under Count de Rochambeau. After his return to France de Chastellux published a volume of "Travels in North America in 1780-2." It appears, from this volume, that while the allied armies were awaiting at Yorktown, Va., after the surrender of Cornwallis, for the ratification of a treaty of peace with Great Britain, that the Marquis, accompanied by other French officers, making quite a company of gentlemen and servants on horseback, visited the Natural Bridge, in Virginia, going by way of Charlottesville and Rockfish Gap, to Waynesboro, Augusta county, following what is now the general route of the Chesapeake & Ohio Ry., and thence by way of Greenville and Steele's Tavern (Midway) to the Bridge, and returning by the James River gap of the Blue Ridge (Balcony Falls), and so on, by the James River route, to Richmond.

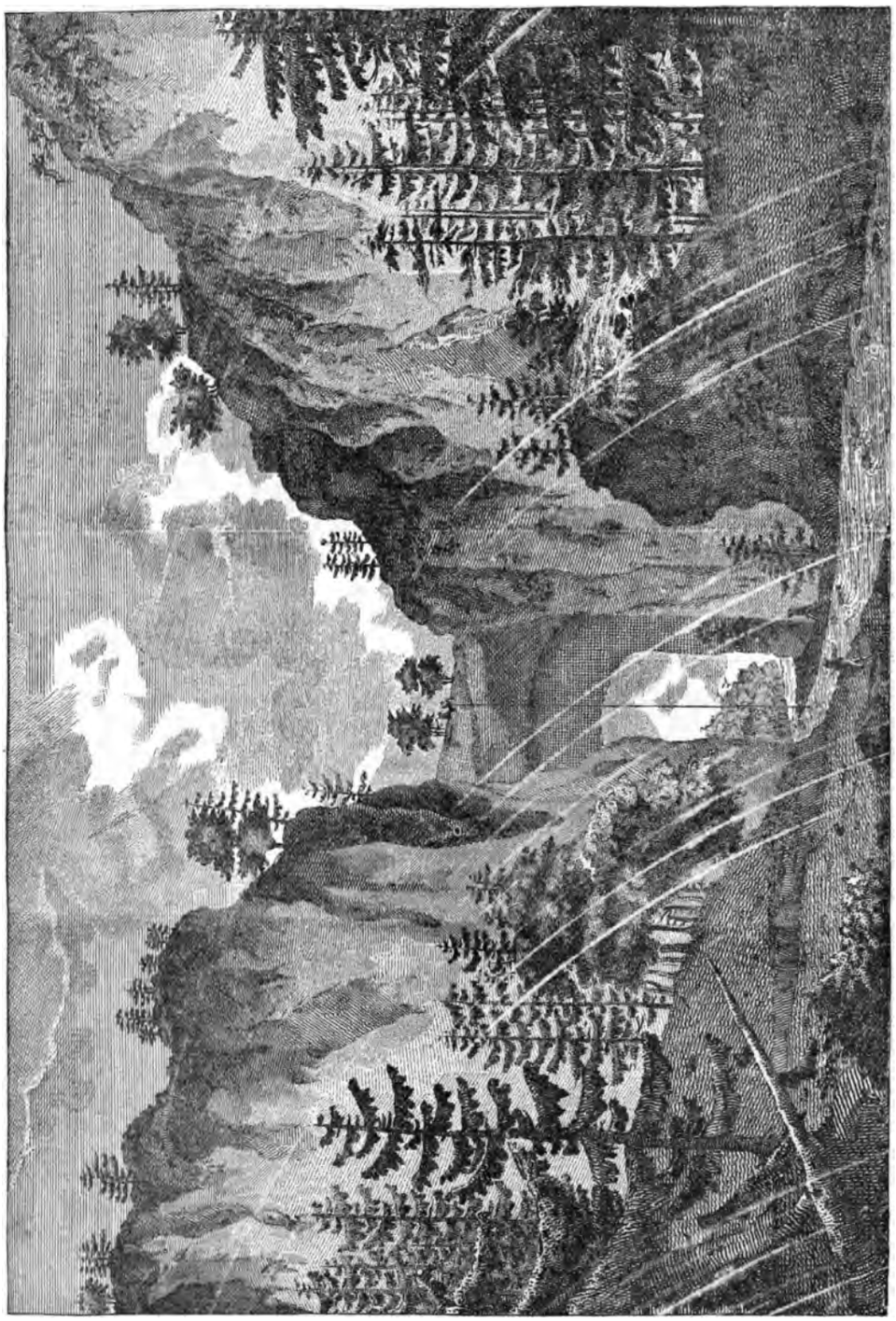
The following extract concerning the Natural Bridge is from Vol. II, page 90, of the 1787 English edition of these Travels in the library of the American Philosophical Society, Philadelphia Pa.

Having been conducted by a countryman along the public road the Marquis was halted with the question : "You desire to see the Natural Bridge, don't you, sir ? You are now upon it ; alight and go twenty steps either to the right or left, and you will see this prodigy." The Marquis continues : "I had perceived that there was on each side a considerable deep hollow, but the trees had prevented me from forming any judgment, or paying much attention to it.—Approaching the precipice, I saw at first two great masses or chains of rocks, which formed the bottom of a ravine, or rather of an immense abyss ; but placing myself, not without precaution, upon the brink of the precipice, I saw that these two buttresses were joined under my feet, forming a vault, of which I could yet form no idea but from its height. After enjoying this magnificent but tremendous spectacle, which many persons could not bear to look at, I went to the western side ; the aspect was not less imposing but more picturesque. This *Thebais*, these ancient pines, these enormous masses of rocks, so much the more astonishing as they appear to possess a wild symmetry, and rudely to concur, as it were, in forming a certain design ; all this apparatus of rude and shapeless Nature which Art attempts in vain, attacks at once the senses and the thoughts, and excites a gloomy and melancholy admiration. But it is at the foot of these rocks, on the edge of a little stream which flows under this immense arch, that we must judge of its astonishing structure ; there we discover its immense spurs, its back-bendings, and those puples which architecture might have given it. The arch is not compliat, the eastern part of it not being so large as the western, because the mountain is more elevated on this than on the opposite side. It is very extraordinary that at the bottom of the stream there appear no considerable ruins, no trace of any violent laceration, which could have destroyed the kernel of the rock, and have left the upper part alone subsisting ; for that is the only hypothesis that can account for such a prodigy. We can have no possible recourse either to a volcano or a deluge, no trace of a sudden conflagration, or of a slow and tedious undermining by water.

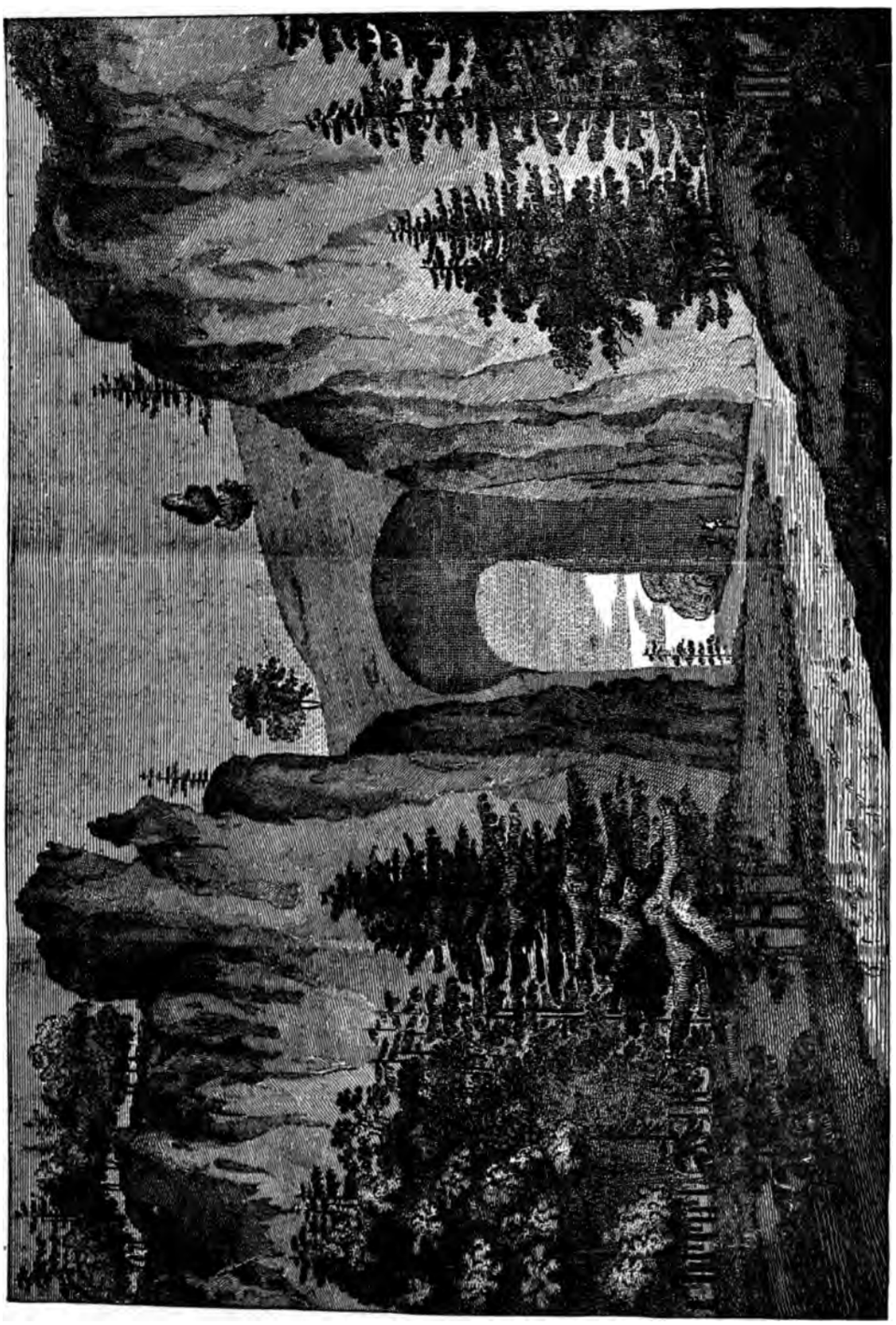
The rock is of the calcareous kind, and its different strata are horizontal ; a circumstance which excludes even the idea of an earthquake or subterranean cavern. It is not, in short, for a small number of travellers to give a decided opinion for the public on this phenomenon of Nature. It belongs to the learned of both worlds to judge of it, and they will now be enabled to attempt the discussion. The necessary steps are taken to render it as public as its singularity deserves. An officer of the engineers, the Baron de Turpin, an excellent mathematician and an accurate draughtsman, is gone to take the principal aspects and dimensions. His labors will supply the deficiency of my description. Though unacquainted with the powers of Nature, we may at least have some idea of our own. I shall therefore leave to more able hands the care of finishing this picture, of which I have given only an imperfect sketch, and continue the relation of our journey, which though the principal objects be already accomplished, is not near being terminated, for the Natural Bridge is more than 250 miles from Williamsburgh."

As the Marquis states, Baron de Turpin and his assistant engineers made careful sketches and measurements of the Bridge and a map of its vicinity ; these are photographically reproduced, in this issue of *The Virginias*, from the edition above mentioned. The report of Baron de Turpin is given in an appendix on page 418 of Vol. II. This will be given hereafter.

Gem Furnace, of the Shenandoah Iron Co., at Milnes, Page county, Va., on Shenandoah Valley R. R., has again gone into blast with two new Whitwell stoves and other improvements added to its former outfit. It is confidently expected that its output will now reach nearly 100 tons a day. This furnace first went into blast Feb. 1, 1883. Victoria furnace, near Goshen station of Chesapeake & Ohio Ry., has gone out of blast.



The Natural Bridge of Virginia, from the East. — By the French Engineers in 1782.



The Natural Bridge of Virginia, from the West. — By the French Engineers in 1782.

Coal and Coke Traffic of Ches. & Ohio Ry. for February, 1883 and 1884.—General Manager C. W. Smith, sends *The Virginias* the data for the following statement of the total output and distribution of coal and coke received from mines on line of C.& O. Ry., (including fuel on Lexington division) during February, 1884, and February 1883, in tons of 2,000 lbs., compiled by fuel agent, J. W. Hopkins:

Kind.	1884.	1883.	Increase.	Decrease.
Cannel	166	3,039	....	2,873
Gas	22,390	26,677	....	4,287
Splint and block	5,449	9,393	....	3,945
New River, &c	36,080	34,201	1,879	.....
Coke	5,064	9,993	....	4,929
Totals	69,149	83,303	1,878	16,033

The distribution of the above was as follows:

	1884.	1883.
1. To Ches. & Ohio Co. for its own use	15,183	14,215
2. To Huntington, for West via Ohio river	.....	251
3. On Elizabethtown, Lexington & Big Sandy RR	1,988	3,705
4. On Ches. & Ohio Ry., exceoting Richmond.	11,993	16,906
5. To Richmond & Alleghany RR. at Clifton Forge.	946	984
6. To Valley RR. of Baltimore & Ohio at Staunton.	.....	....
7. To Shenandoah Valley RR. at Waynesboro	32	105
8. To Va. Midland Ry. at Charlottesville	4,148	5,413
9. To Richmond, Fredericksb'g & Potomac RR. Junc.	262	491
10. To Richmond for consumption including tugs, &c	8,752	12,258
11. To James River wharves for shipment	.....	2,447
12 To Newport News { Consump'n includ'g tugs &c,	943	351
12 To Newport News { For shipment	24,902	26,177
Totals	69,149	83,303

The movement from January 1, 1884 to Feb. 28, inclusive. and for same time of 1873, was as follows:

Kind.	1884.	1883.	Increase.	Decrease.
Cannel	279	4,711	.....	4,432
Gas	48,972	51,294	.....	2,322
Splint and block	11,967	23,048	.....	11,081
New River, &c	76,704	65,438	11,266	.....
Coke	10,767	19,441	.....	8,674
Totals	148,683	163,932	11,266	26,509

The above shows a falling off of 15,243 tons in the movement of 1884 up to Feb. 28 as compared with same period of 1883.

American coals are to be made the subject of a thorough and exhaustive study by the Smithsonian Institution, as we learn from Prof. Fred. P. Dewey of the chemical department of that institution, one that has well and wisely carried out the purpose of its founder "to increase and diffuse knowledge among men."

The consumption of all kinds of coal for all sorts of purposes, in the United States, is simply enormous—over 86-million tons in 1882 and 96 million in 1883–and yet we know positively but little about what one might safely call the hundreds of varieties of coal now in use in this country. We cannot, as a rule, say with good reasons why one coal is better for some special purpose than another, and yet we have, at many points in our coal basins, a dozen workable beds of coal, placed one above the other, which no man will pretend to say have not each different adaptations.—We take it that the Smithsonian proposes a thorough investigation, on a broad and independent basis, of the composition, physical character, steam-making power, coking properties, etc., etc., of all the coals now accessible in the U. S.; in short, to find out what there is to be known about our coals and also to thoroughly investigate our cokes. This is a great and worthy undertaking, one that will result, beyond question, in great good to the whole country and redound to the credit of the Smithsonian. It is to be hoped that all interested in coal will give a hearty support to this movement by supplying materials for these investigations.

Three decades of Bee-keeping in Virginia.—On page 64 are given, by counties and grand divisions, the production of honey and beeswax in Virginia in 1879, as reported in the census of 1880. The following table gives the *production of honey*, in pounds, in Virginia, by grand divisions, at each of the last three decades.

	1879.	1869.	1859.
Tidewater	95,445	38,358	69,976
Midland	197,871	93,134	253,502
Piedmont	211,873	150,544	326,518
Blue Ridge	72,122	21,227	29,947
The Valley	231,980	96,377	161,817
Apalachia	236,778	82,976	129,042
Trans-Apalachia	44,402	22,628	37,400
Totals	1,090,451	505,239	1,008,232

This table shows that the production of 1869 was only about half that of 1859, a result of the destruction of the intervening civil war, In 1879 this industry had fully recuperated, the production of that year being nearly double that of 1869, and 64,739 pounds more that of 1859. Virginia ranked 9th among the states in the production of honey in 1879, Tennessee being 1st, with a production of 2,130,689 pounds. Virginia produced 1-23rd of the honey crop of the Union in 1859 and also in 1879, thus regaining her position in production.—There is no question but that this state has numerous large areas that are unsurpassed for the prosecution of apiculture. regions where climate and exposure are all that can be desired and where the pasturage is ample, from early April to late November, for many large colonies of bees.—Our people do not give enough attention to this most pleasant and profitable industry.—(For location of conuties and natural grand divisions see map on page 31.)

The following table gives the production of *beeswax*, in pounds. in Virginia, by grand divisions, as the above does of honey, and for same years.

	1879.	1869.	1859.
Tidewater	7 072	2,298	7,067
Midland	14,172	5,504	20,635
Piedmont	11,100	7,617	24,251
Blue Ridge	2,308	683	2,725
The Valley	7,399	4,404	9,040
Apalachia	9,378	4,253	6,193
Trans-Apalachia	1,769	1,679	4,463
Totals	53,200	26,438	74,374

It appears from the above that the production of wax has not kept up with that of honey.

American Institute of Mining Engineers will hold its next meeting at Chicago, begining Tuesday, May 27. The following program is provisionally announced: *Tuesday evening*, opening session; *Wednesday*, excursions to South Chicago and Pullman; *Wednesday evening*, session; *Thursday*, excursion to La Salle and other points; *Friday morning and afternoon*, sessions; *Friday evening*, banquet.

The hotels in Chicago will probably be crowded; and members desiring hotel accomodations should write *at once* to *Mr. John Crerar, Jr.*, 109 Dearborn Street, Chicago. Headquarters will be at the Grand Pacific Hotel. Board will be from $3 to $5 per day, according to rooms.

Members expecting to attend the meeting should notify the Secretary (Box 223, New York P. O.) at an early day. Arrangements as to railway facilities, etc., will be hereafter communicated to those who have so notified the Secretary.

The Virginias.

Serial No. 53. Vol. V.—No. 5.

Staunton, Va., May, 1884.

Jed. Hotchkiss, Editor.

Real Estate Investments the best.—Under this caption the "Baltimore Sun" of the 15th instant wisely comments as below. It is well known that the substantially wealthy proprietor of that ably and discreetly conducted daily has always practiced the advice here given, that most of his millions are invested in coal and other lands,and that the growth of his possessions into millions has been largely the result of the growth in value of these lands. We would give the same advice and at the same time call attention to the very great advantages for such investments offered in the now low-priced farm, grazing, timber, coal, iron, and other mineral lands of Virginia and West Virginia. No condition of financial affairs can possibly happen that will not find the cash value of many of these doubled or even quadrupled in the next five years:

"One of the obvious lessons to be drawn from the panic which swept through Wall street yesterday is the old, familiar axiom, which even the most prudent investors are constantly in danger of forgeting, that securities which have merely an accidental or ficticious value are no securities at all. In time of trial, when credit for the moment is paralyzed, they disappear like chaff before the wind, leaving ruin and sorrow in their wake. Men who have been accustomed to regard themselves as millionaires, because they owned or controled vast sums in such securities, find themselves of a sudden reduced almost to penury, their collossal fortunes—on paper—vanished into thin air. At such a time those who have money to invest naturally ask how they may best protect themselves from risks of this character, and one of the first suggestions likely to present itself is the superiority, in point of *safeness*, of real estate investments over almost any other class of securities. 'It's an ill wind that blows nobody any good,' and one of the beneficial effects which are likely to follow the crash in Wall street, that sent a thrill of anxiety through the hearts of investors all over the country yesterday, will probably be to bring into prominence a class of investments that can be seen and felt, that will not be blown about by every breath of speculation, and that can be shaken by nothing short of a physical or financial earthquake. Real estate, as a general rule, does not pay the rapid and heavy profits that are sometimes realized from stock speculations, and it is for this reason that the majority of investors fail to appreciate the advantages that are to be found in the judicious expenditure of money in this direction. But if it does not make such large and quick returns, it does not slide from under the feet of those who trust their money to it, as such days as yesterday show that even the best stocks may do. Conservative people, therefore, in view of these recent lessons, will turn with fresh interest to real estate investments, which cannot take wings to themselves and fly away in a single hour with the savings and accumulations of a lifetime."

The Chesapeake & Ohio Railway of today is a good illustration of the business developments that have taken place in the Virginias in the past twenty years. When our late civil war ended it consisted of 195 miles of dilapidated and poorly equiped iron-railed road that, under the name of the Virginia Central Railroad, extended from Richmond to Jackson River, a mere projection into the mountains of Apalachian Virginia, with which the Orange & Alexandria Railroad (now the Virginia Midland) made a northward connection at Gordonsville and a southward at Charlottesville, and the Richmond, Fredericksburg & Potomac RR., made a nominal rail and water connection northward. Now it is not only a superbly appointed steel-railed roadway, from Newport-News on the great harbor of the Atlantic seaboard, extending 502 miles entirely across the central breadth of both Virginia and West Virginia to the Ohio, at the Big Sandy, conneeting with a half dozen lines of railways, leading northward and southward,in its course, but it has also extended its own direct lines until its mile-posts tally: Lexington, Kentucky, 634 miles; Cincinnati, Ohio, 710 miles; Livingston, Kentucky, 674 miles; and Maysville Kentucky, 680 miles, westward from its "golden mile-post" at Newport-News. Its passenger trains run through from Newport News and from Washington, the National Capital, to Louisville, Kentucky,—and more, it has just now perfected its own system southward and westward, and established its depots at Memphis, New Orleans and San Francisco, stretching its lines from ocean to ocean and becoming trans-continental in character.

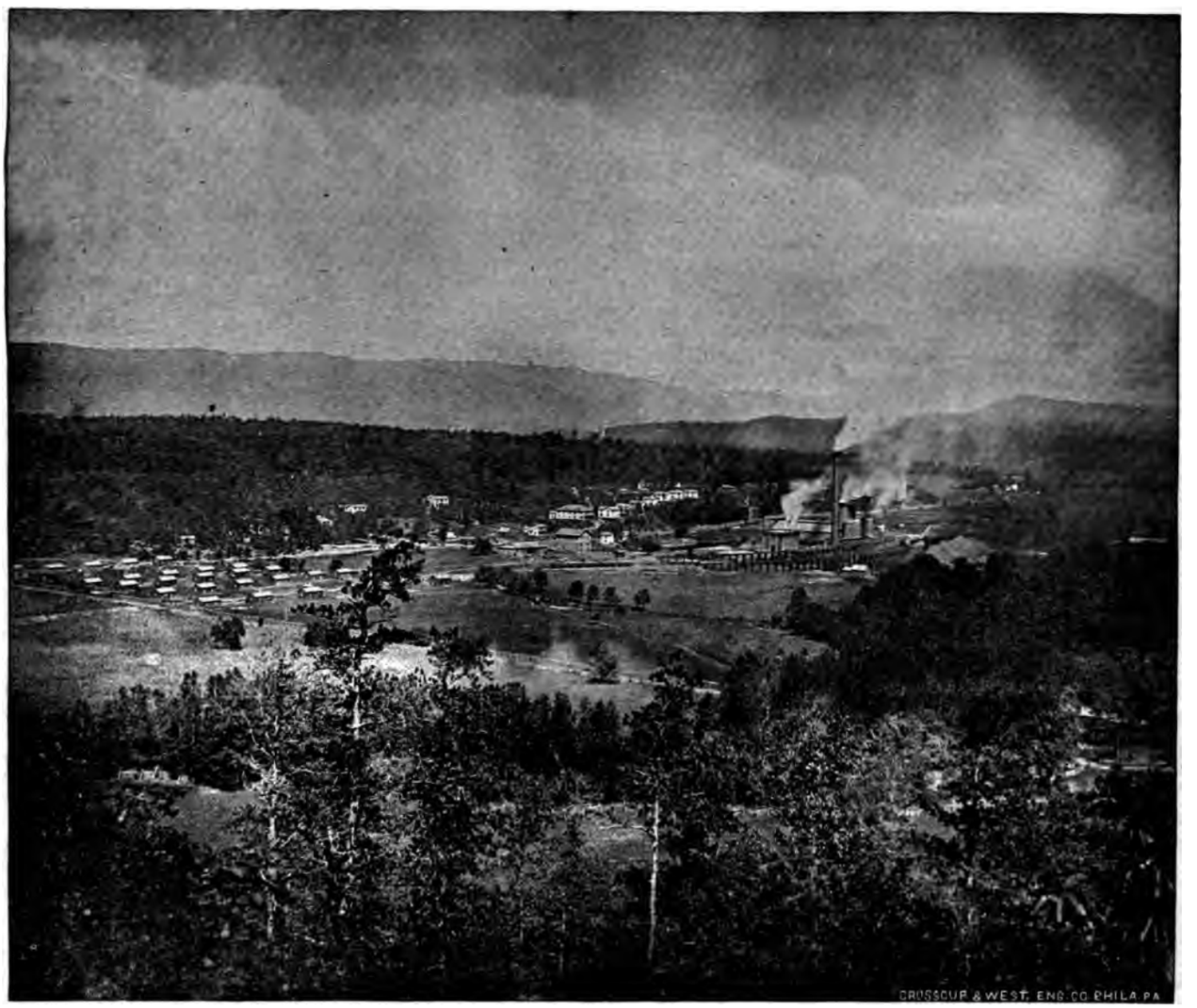
The recent publication of the sixth annual report, that for the calendar year 1883, of the Chesapeake & Ohio Railway Company, in a pamphlet of 47 pages full of interesting and valuable information, makes this an opportunity, of which we gladly avail ourselves, to give in this number of *The Virginias* a considerable space to matters pertaining to this railway with special illustrations.

The gross earnings of this railway in 1883 were $3,906,792; operating expenses and taxes $2,599,933; leaving for net earnings $1,306,859—a gain of $274,330 over the net earnings of 1882.—The floods in the Ohio valley,thegreatly diminished demand abroad for American bread-stuffs, and the depression in the iron and other industries of the country, kept down the volume of railway traffic and prevented the realization by this company of the full benefits it had a right to expect from the recent extension of its road to the great ocean harbor of Newport-News.

The completion of a grain elevator at Newport-News, on the best known plan, with a capacity for storing 1,500,000 bushels of grain, is reported with the statement that it "will, without doubt, prove one of the most efficient elevators on the Atlantic seaboard," one that "must become a valuable auxiliary to the C. & O. and lead to a large development of its grain traffic."

President Huntington says: "The coal traffic for the year, notwithstanding the depressed state of the iron manufacturing and other industries upon which the consumption of coal largely depends, continues to show an increase; and it is quite gratifying to know that the development of the coal properties in the Kanawha and New River districts has likewise improved, not only as to number and capacity of output, but particularly in financial stability. The demand for steam coal for ocean steamers which put into Newport-News for their fuel has also very largely increased, and we have every reason to believe that this demand will continue to increase in proportion to the increase in tests of the coal for fuel purposes, which, up to the present time, has been pronounced superior in quality by nearly every steamship that has used it. One hundred and seventy-seven ocean steamers were supplied with fuel from this company's wharves at Newport-News during the year. A much larger number, I am satisfied, would have touched at this port, but for the arbitrary restrictions placed upon this commerce by the compulsory pilotage laws in Virginia."

[Continued on page 85.]

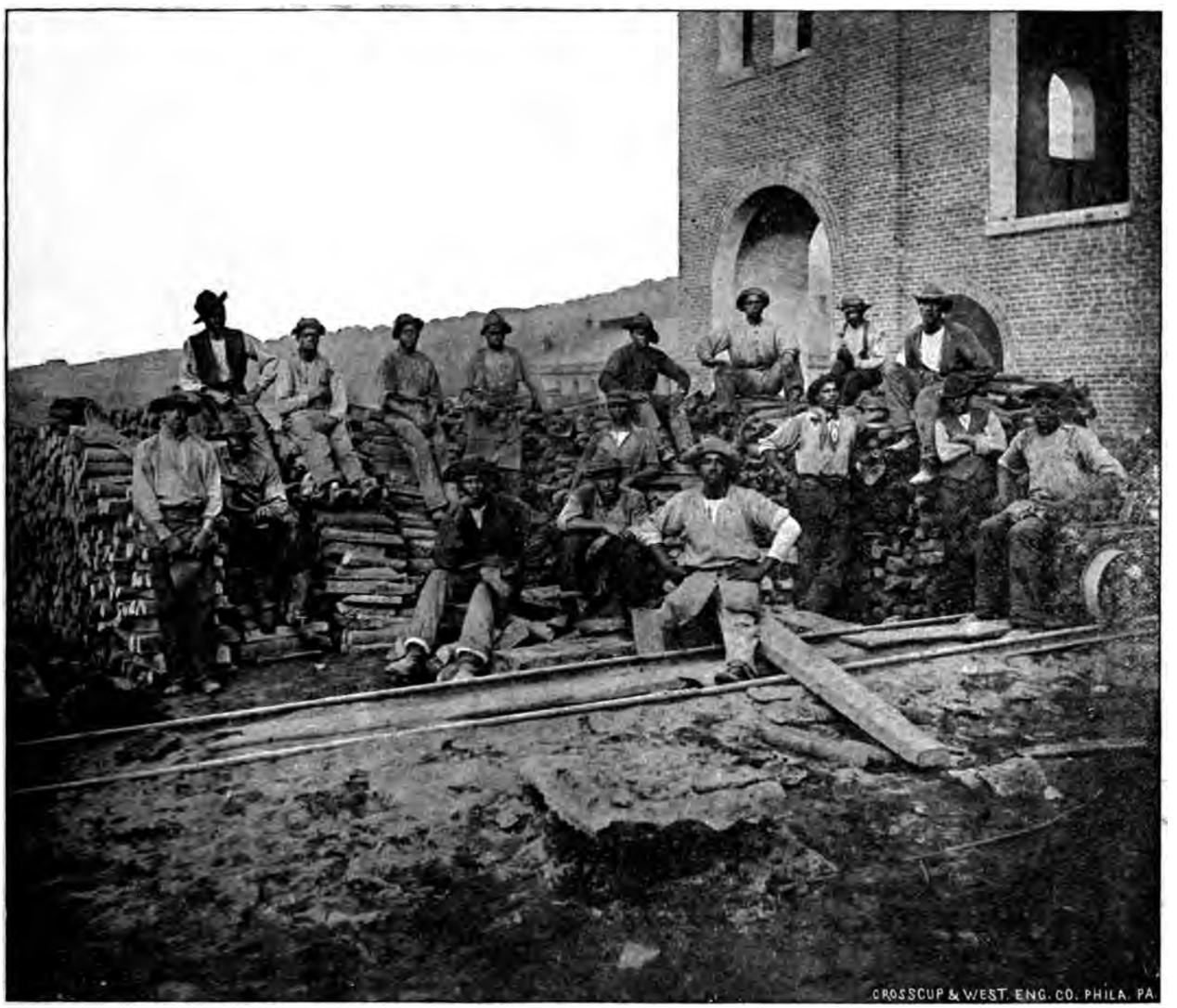


Victoria Furnace, Va.—Above we present, as an illustration of iron-making on the Chesapeake & Ohio Railway in Virginia, a view of the great blast-furnace and its village and surroundings that, under the name of Victoria, English capitalists have erected and put in operation in the valley of the Calf-pasture river near Goshen station, Rockbridge Co.

This furnace was completed and put in blast the first of May, 1883, after an expenditure of over a million dollars in its erection and in the purchase and development of iron ore, limestone and furnace site lands, the construction of railways, dwellings, shops, etc., by a party of English gentlemen incorporated as the Iron and Steel Works Association of Virginia, Limited. During the first year of its blast it made over 25,000 tons of pig iron, averaging over 100 tons for each day it was in blast; its largest daily output was 153 tons. It went out of blast April 14th, 1884, for some needed repairs to its lining and for some changes that experience in its workings had suggested would increase its efficiency. These repairs and changes are now being made as speedily as possible and by the first of July it is expected it will be again in blast and producing regularly over a thousand tons of pig iron a week.—This furnace was constructed as one of a pair, of equal capacity, to be placed side by side, and it is in contemplation to erect the other stack at an early day.

The officers of the Iron and Steel Works Association of Virginia, are: Col. George Arbuthnot, Chairman; Mr. Adam Norris, Secretary, and Mr. J. B. Edwardes, Dr. H. G. Houghton, Capt. E. Digby Boycott, Mr. H. J. Ll. Price, Directors, all of England, and most of them of London, in which city, at 41 Haymarket, S. W., is the principal office of the Association. The officers at the furnace and mines are: Capt. Wm. N. Page, of Virginia, General Manager, and Mr. W. O. Skelton, Assistant General Manager.

Victoria furnace has many advantages in its favor for making excelent pig iron cheaply. It has its own iron ores, in stratified beds from which vast quantities of high grade ores can be easily quarried and mined in open cuts above water-level, but a few miles from the furnace by its own railway; it has its own quarries of first rate limestone equally accessible; it is but 116 miles, by the C. & O. Ry., from the New River coking coal-field and its furnace fuel of unsurpassed excelence; and it is located in a region having an abundance of labor and food supplies of all kinds at command and a climate extremely favorable, all-the-year-round, for blast-furnace and mining operations.



Group of Negro Laborers at Victoria Furnace, Virginia.

Virginia Negro laborers.—It is a well ascertained fact that the most costly single element in mining and manufacturing operations is labor; consequently one of the first economic questions to be considered in embarking in such enterprises in any region—no matter what other advantages it may possess in the way of good, abundant and cheap raw materials, accessibility to market, favorable climate, etc., etc.—is, what is the kind, character, quantity and cost of the labor that region can supply to meet most of the demands of the proposed business. Fortunately for the Virginias they can answer this question, in an everyway satisfactory manner, by calling attention to the very large body of strong, hearty, active, docile and easily contented negro laborers, satisfied with reasonable wages, existing within the limits of Virginia and having an unchangeable attachment to her climate and her people and an inherent fondness for engaging in occupations in which large numbers of operatives are intimately associated.

We have often called attention to this class of labor as one of the great inducements the Virginias can offer to those that would engage in any kind of mining and in any of the coarser and heavier kinds of manufacturing—those of iron for example—within their borders. Another opportunity is offered for calling attention to this labor by the above picture of a group of the negro laborers employed at the great Victoria furnace, near Goshen on the Chesapeake & Ohio Ry., where a large majority of the employés are men of this race.

This illustration of labor resting upon the products of its toil, is photographically reproduced from a photograph, so it is a life-picture which anyone desiring to study the general characteristics of the forms and features of this class of labor may enlarge for that purpose.—We submit that this group of negro furnace hands, unexpectedly called for a moment before the camera to be "taken," will compare favorably in appearance with almost any set of laborers that could in like manner be called up at furnaces elsewhere. We know that almost without exception those that have employed them for the purposes specified prefer them to any other kind of labor; they conform to the apostolic maxim of being "contented with their wages," and they have no disposition to "strike"

List of Collieries on Chesapeake & Ohio Ry.—The following list, from official sources, contains all the collieries on the line of the Chesapeake & Ohio Ry. in West Virginia May 1, 1884, taken in order from the most eastern to the most western.

1. Collieries in New River or Lower Measures Coals.

Collieries.	Operators or owners.	Miles from Newport News.
1 Quinnimont	Quinnimont Coal & Iron Co	369.26
2. Stone Cliff	Fayette Coal & Coke Co	379.5
3. Echo	Wm. Beury, Cooper & Co	383.9
4. Fire Creek	Fire Creek Coal & Coke Co	384.7
5. Sewell	Longdale Iron Co	386.71
6. Caperton	New River Coal & Coke Co	389.75
7. Caperton	Wm. Beury, Cooper & Co	390.0
8. Keeney Creek	John Nuttall & Co	391.0
9. Nuttall	Nuttallburg Coal Co	391.86
10. Fayette	Masters & Straughan	394.25
11. Elmo	Wm. A. Burke & Co	396.34
12. Sunnyside	Reed, Lucas & Co	397.1
13. Gaymont	J. Pierrwig	398.0

The above 13 collieries are all in beds of New River or Lower Coal Measures—Rogers' No. XII—coals. These coals are semi-bituminous in character and are not surpassed by any coals known for the production of steam and for the manufacture of the very best grades of coke for metalurgical purposes. They are noted for containing very high percentages of fixed carbon, medium ones of volatile matter, and very low ones of ash, sulphur and phosphorus; qualities that enter into the composition of the coke made from these coals and give it the high reputation it has gained as a blast-furnace fuel.

2. Collieries in Kanawha or Middle Measures Coals.

Collieries.	Operators or owners.	Miles from Newport News.
1. Gauley Mountain	Hawks-Nest Coal Co	405.0
2. Mt. Carbon	Gt. Kanawha Colliery Co	413.9
3. St. Clair	St. Clair Coal & Coke Co	414.0
4. Eagle	Wm. Wyant	414.0
5. Faulkner No. 1	Fred. Faulkner	416.09
6. " No. 2	" "	416.09
7. Crescent No. 1	W. R. Johnson	417.0
8. " No. 2	" "	417.0
9. West Crescent	" "	417.10
10. Cannelton (cannel)	Cannelton Coal Co	417.91
11. " (block)	" " "	417.69
12. Coal Valley	Coal Valley Coal Co	417.69
13. Straughan	Straughan Mining Co	418.0
14. Eureka	M. T. Davis & Co	418.0
15. Excelsior	" " "	418.0
16. Morris Creek Cresent	Carver Brothers	419.0
17. Mt. Morris	Mt. Morris Coal Co	419.5
18. Union	Union Coal Co	419.5
19. Kanawha	Kanawha Mining Co	419.5
20. Wyoming (gas)	Wyoming Mfg. Co	419.9
21. " (splint)	" " "	419.9
22. Paint Creek*	Kanawha Cannel Coal Co	425.0
23. Crown Hill	Crown Hill Splint Coal Co	425.0
24. Edith-Marion	Wm. Sharpe	404.2
25. East Bank	Stuart M. Buck	425.4
26 Coalburg	Robinson Coal Co	427.6
27. Fairfields	Fairfields Coal & Coke Co	425.0
28. Reynolds	Reynolds & Sturdevant	425.0
29. Stevens	Stevens Coal & Coke Co	425.0
30. Sunnyside	Sunnyside Coal Co	425.0
31. McCarthy	McCarthy Brothers	425.0
32. Winifrede	Winifrede Coal Co	436.0
33. Carkin	W. S. Carkin	438.5
34. Black Band	Black Band Iron & Coal Co	455.0

The above 37 collieries are in the bituminous coal beds of the Middle Coal measures, formation No. XIII of the Virginia series, those known in the markets as Kanawha coals. These collieries are in but 4 or 5 of the 12 workable beds of coal that have been proven in these measures; they produce cannel, gas, and splint or block coals that wherever used and known have a reputation equal to that of any coals of this class in the United States for steam, domestic, gas-making and other purposes, for use "raw" in blast-furnaces, foundries, etc.; the coal mined at Gauley Mountain, Mt. Carbon, St Clair, Eagle, Faulkner No 1 and Crescent No. 2 is used for coking purposes and yields a coke that sustains an excelent reputation. The Cannelton and Paint Creek companies mine a superior cannel coal.

The 47 collieries above enumerated are all on the immediate line of the C. & O. Ry., or branches connected with it, and on the same side of the river, except Cannelton which is connected with the railway by a ferry. On the other side of the Great Kanawha from the railway are: Cedar Grove, Peabody, and North Coalburg collieries, nearly opposite Coalburg; Dana, Campbell Creek, Lewis and Pioneer, nearly opposite Malden, all in Kanawha coals; and Raymond City, Queen City and Oak Ridge, below Charleston and on the line of the Kanawha branch of the Ohio Central Ry., all in the Upper Coal measures in the Pittsburg bed.

Pocahontas coal mine.—Supt. W. A. Lathrop furnishes *The Virginias* the following statement—in continuation of previous report on page 46 of this volume—of the coal and coke business of the Pocahontas mines of the S. W. Va. Improvement Co. during the months of March and April, 1884, in 2,000 lbs. tons.

	March.	April.
Coal shiped	9,221	8,453 tons.
Coal coked	5,555	4,780 "
Total output	14,776	12,233 "

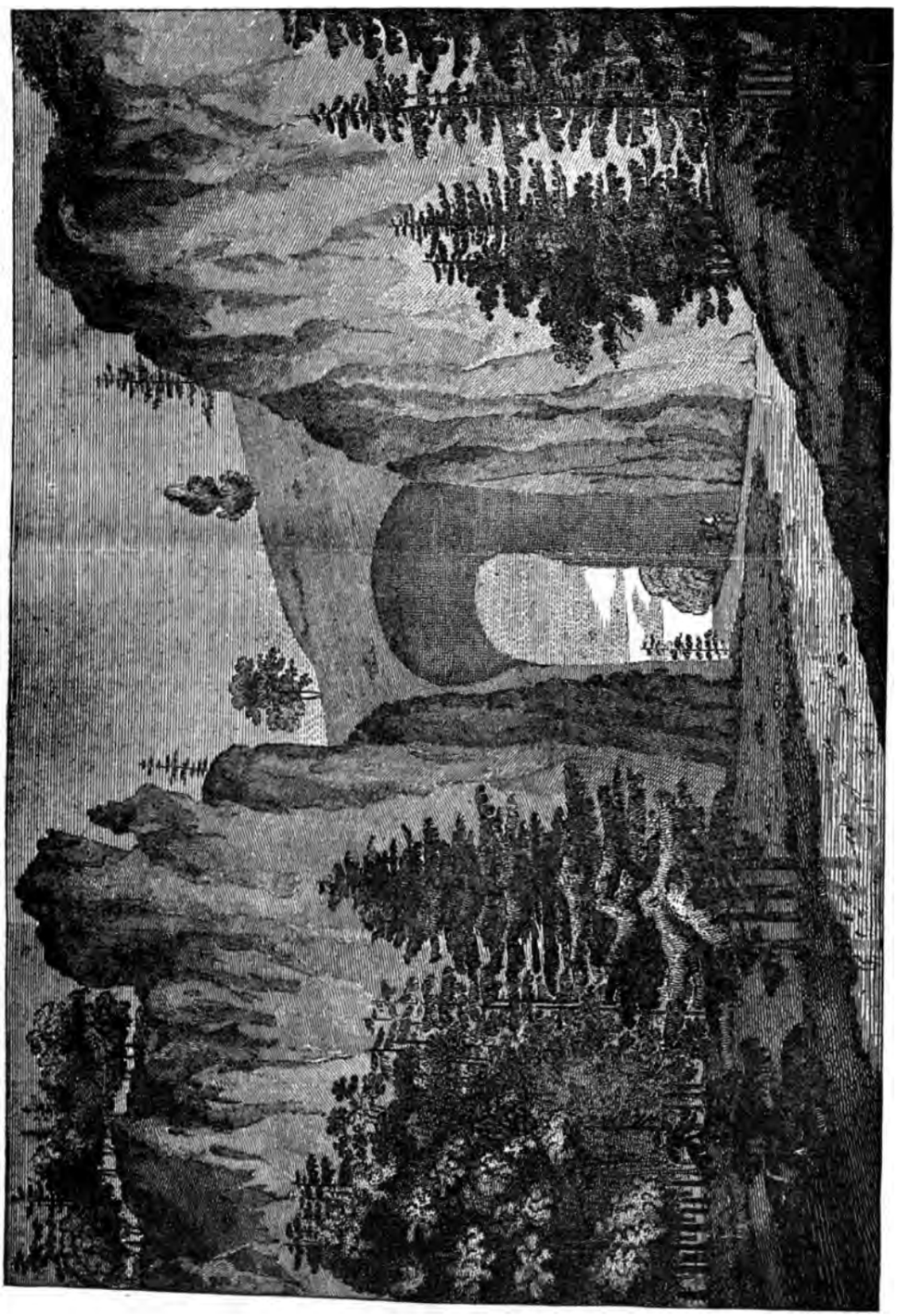
Output from Jan. 1 to May 1, 1884.

Coal shiped	54,417 tons.
Coal coked	31,856 "
Total output	86,273 "

On the 8th instant, mining operations were resumed in the East mine which has been closed and undergoing repairs since the fatal explosion of March 13th. Mining has been going on in the West mine and by the middle of this month the daily output from both mines at Pocahontas was about 800 tons a day; by June 1st it is expected to have a daily output of from 1200 to 1500 tons. The East mine was not very greatly damaged by the explosion It has been put in thorough order again with some, but not many, changes in the mode of ventilation, and is now in successful operation again.

On the 1st of May Mr. H. Wickham, vice-president of the S-W. Va. Improvement Co., assumed the duties that had been discharged by Mr. J. P. Ilsley the retiring president of that company. It is stated that Mr. Wickham will have his office at Roanoke.

Mr. W. A. Lathrop, who has been superintendent of the S-W. Va., Improvement Co., at Pocahontas, from the commencement of mining operations at that place, has resigned that office as of June 1st. The position held by Mr. Lathrop has been a very difficult and troublesome one, his charge being the opening and puting in operation of an extensive colliery in an entirely new and undeveloped coal-field in a comparatively wild and when he began almost inaccessible region. It is due to him to say that he has done his work well and that he has won the esteem and confidence of all that have come in contact with him. We regret that he leaves Virginia; he has accepted a desirable position at the Snowshoe colliery in Pennsylvania.



The Natural Bridge of Virginia, from the West. — By the French Engineers in 1782.

Coal and Coke Traffic of Ches. Ohio Ry. for March, 1883 and 1884.—General Manager C. W. Smith, sends *The Virginias* the data for the following statement of the total output and distribution of coal and coke received from mines on line of C.& O. Ry., (including fuel on Lexington division) during March, 1884, and March, 1883, in tons of 2,000 lbs., compiled by fuel agent, J. W. Hopkins:

Kind.	1884.	1883.	Increase.	Decrease.
Cannel	427	3,554	....	3,127
Gas	25,286	29,840	....	4,554
Splint and block	6,856	6,083	773	.....
New River, &c	46,842	38,884	7,958	.....
Coke	3,783	12,026	....	8,243
Totals	83,194	90,387	8,731	15,924

The above shows a decrease of 7,193 tons in March 1884, as compared with March 1883. The New River coals made a handsome increase.

The distribution of the above was as follows:

	1884.	1883.
1. To Ches. & Ohio Co. for its own use	20,397	18,200
2. To Huntington, for West via Ohio river	.....	871
3 On Elizabethtown, Lexington & Big Sandy RR	1,173	4,358
4. On Ches. & Ohio Ry., excepting Richmond.	14,678	17,209
5 To Richmond & Alleghany RR. at Clifton Forge.	333	1,509
6. To Valley RR. of Baltimore & Ohio at Staunton.	.....	34
7. To Shenandoah Valley RR. at Waynesboro	12	7
8. To Va. Midland Ry. at Charlottesville	5,417	5,542
9. To Richmond, Fred. & Potomac RR at Junc	98	232
10. To Richmond for consumption including tugs, &c	9,591	11,770
11. To James River wharves for shipment	.....	5,221
12 To Newport News { For consumption, &c,	981	189
12 To Newport News { For shipment	30,514	25,245
Totals	83,194	90,387

The movement from January 1, 1884 to Mar. 31, inclusive, and for same time of 1883, was as follows:

Kind.	1884.	1883.	Increase.	Decrease.
Cannel	706	8,264	.....	7,558
Gas	74,358	81,134	.....	6,876
Splint and block	18,823	29,131	.....	10,308
New River, &c	123,546	104,322	19,224	.....
Coke	14,550	31,468	.....	16,918
Totals	231,883	254,319	19,224	41,660

The above shows a falling off of 22,836 tons in the movement of 1884 up to March 31 as compared with same period of 1883.

The Pyrites deposits of Louisa county, Virginia.—At the Cincinnati meeting of the American Institute of Mining Engineers, Feb., 1884, W. H. Adams, M. E., of New York city, read the following interesting and valuable paper on the Pyrites deposits found near Tolersville station of Chesapeake & Ohio Ry., Louisa county, Virginia:

Virginia, a store house of metals, is more and more a surprise to the present generation. With her enormous available mineral wealth, worked upon steadily for over a century, exploited sufficiently to demonstrate beyond question costs and values, reported upon by our most eminent scientists, written up by thoroughly earnest correspondents, yet we find her little understood by capitalists or practical men, and until very lately overlooked by the advance-guard of pioneers in metalurgy, whose restless energy conquered the wilderness of Northern Michigan years ago, and has written a new and startling history for the almost impenetrable Western territories.

The world is learning through the mouths of giant furnaces lately put in blast at Low Moor, Goshen and Roanoke, more of this wonderful state. It is becoming plain that nearer home, amid all the surroundings of civilization, under an equable climate and with the advantages of a minimum cost for fuel and labor, there are stores of minerals, varied in character and deposited over a wide area, which exceed all ordinary calculations.

Principal among these minerals, iron ores have been, and will probably continue to be, the leading product and the source of greatest revenue.

My attention has been called during the past year to one particular section of the iron belt, where for forty years charcoal-furnaces were successfully operated, the ores being mined in open pits, as can so frequently be seen from the Connecticut line southward into Georgia. There is, however, a significant peculiarity in the character of these deposits of Louisa county warranting special mention, as it is thought that nowhere on the earth's surface, within so moderate a distance of tidewater, can their like be found. Probably half a million tons of lump and wash-material have been taken from pits within five miles of the Tolersville station of the Chesapeake & Ohio Railway. These pits are from 20 to 130 feet in width and of all lengths up to 1500 feet. They have disclosed the fact that invariably at water-level the the iron oxides cease and sulphides are found. As will be understood, the extent of the ore-bodies is enormous, millions of tons lying within a few hundred feet of the surface.

They no doubt belong to the general class of pyritous ores found along the Atlantic seaboard, in Georgia, North Carolina, Virginia (near Lynchburg), Maryland (Cecil county), and New Jersey. The character of these minerals change thence northwardly; but the range of outcrops can readily be traced from Anthony's Nose, on the Hudson, through the mountains near North Adams, Mass., and north of the latter place, where there seems to be a division in the strata,—the eastern branch coming to the surface at intervals as far north as Milan, N. H., and into Maine, while the main branch is found in Vershire and Corinth counties, Vermont, and may be followed thence to the extensive deposits of Capelton and Bolton, in Canada.

I wish to draw particular attention to the remarkable fact that while iron ores outcrop continuously along the belt of country mentioned, yet only in the Carroll county beds on the border line of North Carolina, and in Louisa county are the deposits underlaid with pyrites of such character as to deserve special mention.

The object of this paper is to bring before the Institute the notable merits of pyrites from Virginia, at a time when the manufacturers of sulphuric acid are so rapidly changing their plants from brimstone-burning to pyrites-burning, and are asking for information as to sources of future supplies.*

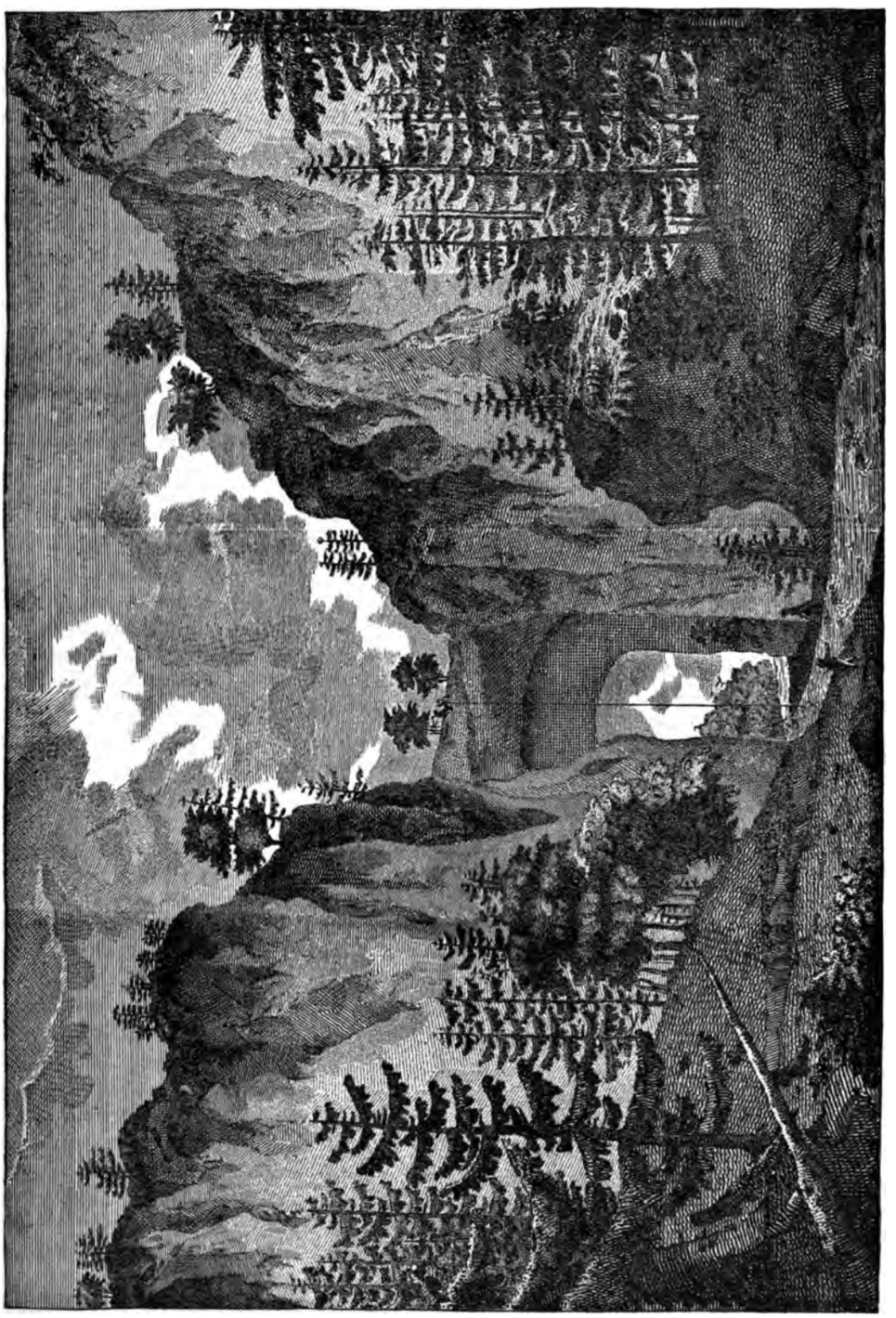
The distribution of these and some other deposits is shown on the accompanying map, on which they are numbered as follows:

1. Birmingham, Alabama.
2. Copper mines, Georgia
3. Ducktown, Tennessee.
4. Carroll county, Virginia.
5. Lynchburg, Virginia
6. Louisa county, Virginia.
7. Cecil county, Maryland.
8. Zinc mines, New Jersey.
9. Anthony's Nose, New York.
10. Iron mines, Connecticut.
11. Rowe mines, Massachusetts.
12. Ely copper mines, Vermont.
13. Milan copper mines, Maine.
14. Copper mines, N. H.
15. Capelton, Canada
16. Brockville, Canada.

It may, however, be interesting, before leaving the subject of surface-ores of iron, to note the possibilities of utilizing, at no distant day, the very large deposits of hematite found throughout this section, which are available in part at present, and will be wholly so when the proper drainage of underlying pyrites beds shall have been accomplished. In this connection I submit the following estimate of cost of making pig-iron, based upon statements of several well-informed parties, viz.:

(Continued on page 80.)

*There were January 1st, 1882, in the United States only two manufacturers burning pyrites, and using 100 tons per day of Canada ores, in which they were interested. At this date about 400 tons per day are burned by 18 works. In other words, there has been 300 per cent increase in about two years.



The Natural Bridge of Virginia, from the East. — By the French Engineers in 1782.

The Picturesque Chesapeake & Ohio Ry.

Clifton Forge Pass.—Head of James River.
(1048 feet above tide.)

When "Captaine John Smith," of famous and worthy memory, wrote of Virginia two hundred and seventy-seven years ago as a country which "heaven and earth never agreed better to frame as a place for man's habitation," he had only seen the "hils, plaines, valleyes rivers, and brookes" and the "faire bay" that makes the "fruitfull and delightsome land" of Tidewater. What would that accomplished soldier, traveler, ruler, natural historian and topographer, have written, for the delight of a world eager for novelty, if he could have crossed the broad undulating plains of Midland, wandered in the lovely vales and seen the wonderfully varied relief of Piedmont, climbed the lofty domes and looked upon the charming perspectives of the Blue Ridge, traversed with delight the glorious landscapes of the Great Valley of Virginia and drank of its bright and abounding waters, threaded the long parallel valleys of Apalachia and gazed in wonder on the grand mountain walls that enclose them, and then found his way across Trans-Apalachia by the wild wonderland of the canyoned gorge of New river of the Kanawha and by the majestic Kanawha itself to the broad and beautiful Ohio?

What Captain John Smith, with his ardent love of nature, longed to see but did not see in the five hundred miles of country that we have glanced across, and which those that for two and a half centuries or more came after him could not have seen but by months or weeks of weary toil, the traveler may now see in the daylight of two days of easy riding over the picturesque Chesapeake & Ohio Railway from Newport-news at the gates of the Chesapeake to Huntington on the banks of the Ohio near the great westward turn of that noble river.

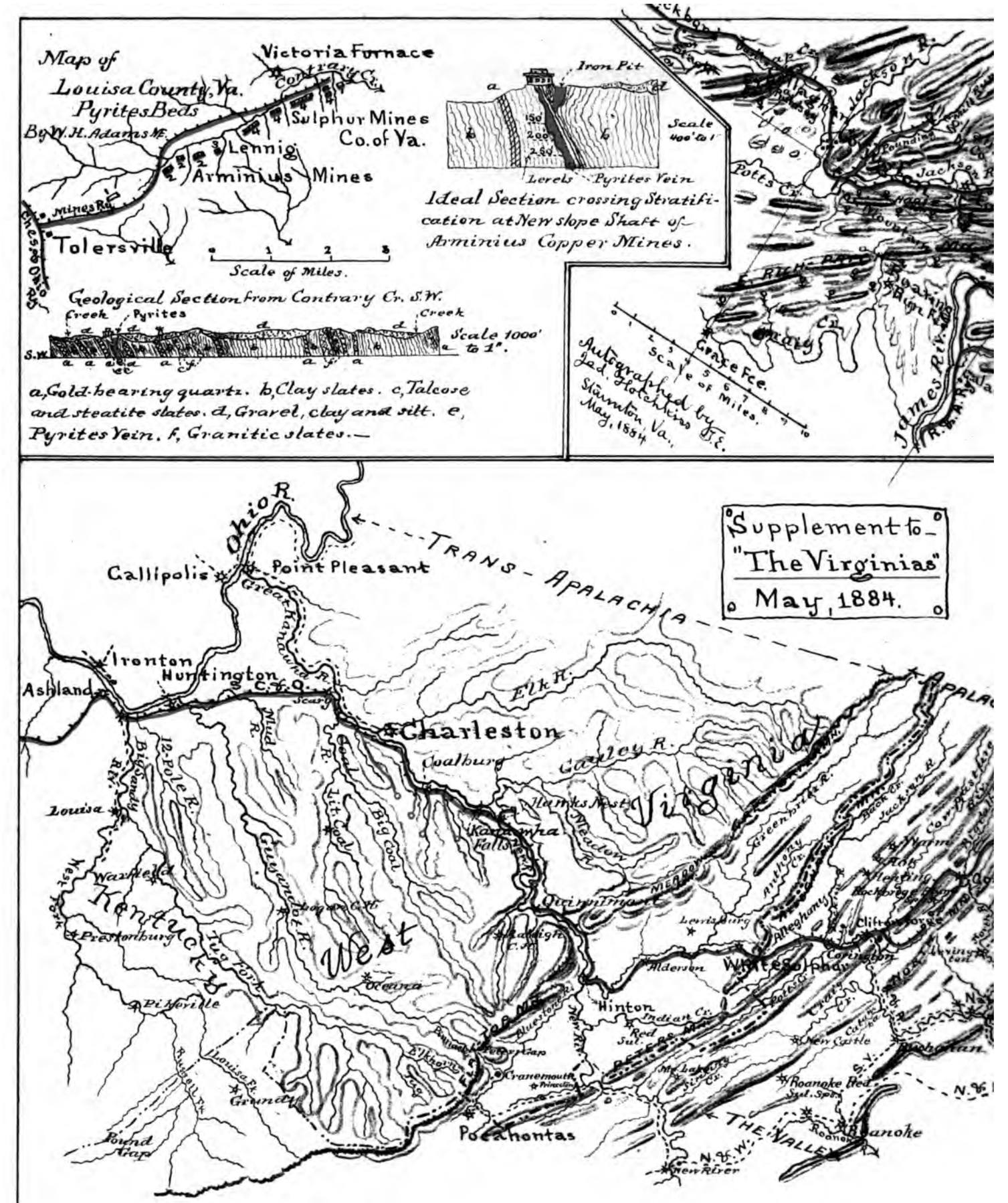
The objects of interest, especially in scenery, that are presented to the traveler passing over the Chesapeake & Ohio railway are remarkable for their number and variety, so great is the extent and so greatly varied is the surface of the country it traverses. Beginning at Old Point Comfort, at the level of the sea, a marine landscape of exceptional beauty is presented in the glimpse of the ocean, between the Capes of Virginia, across the broad bay of the Chesapeake, on the one hand, and the ample expanse of the grand harbor of Hampton Roads on the other. Then eighty miles of the low-lying scenery of Virginia's historic Peninsula, where the forest and cultivated growths are those of the border land of a semi-tropical region and the features of the surface are sculptured from the lately uplifted bed of the Tertiary ocean.

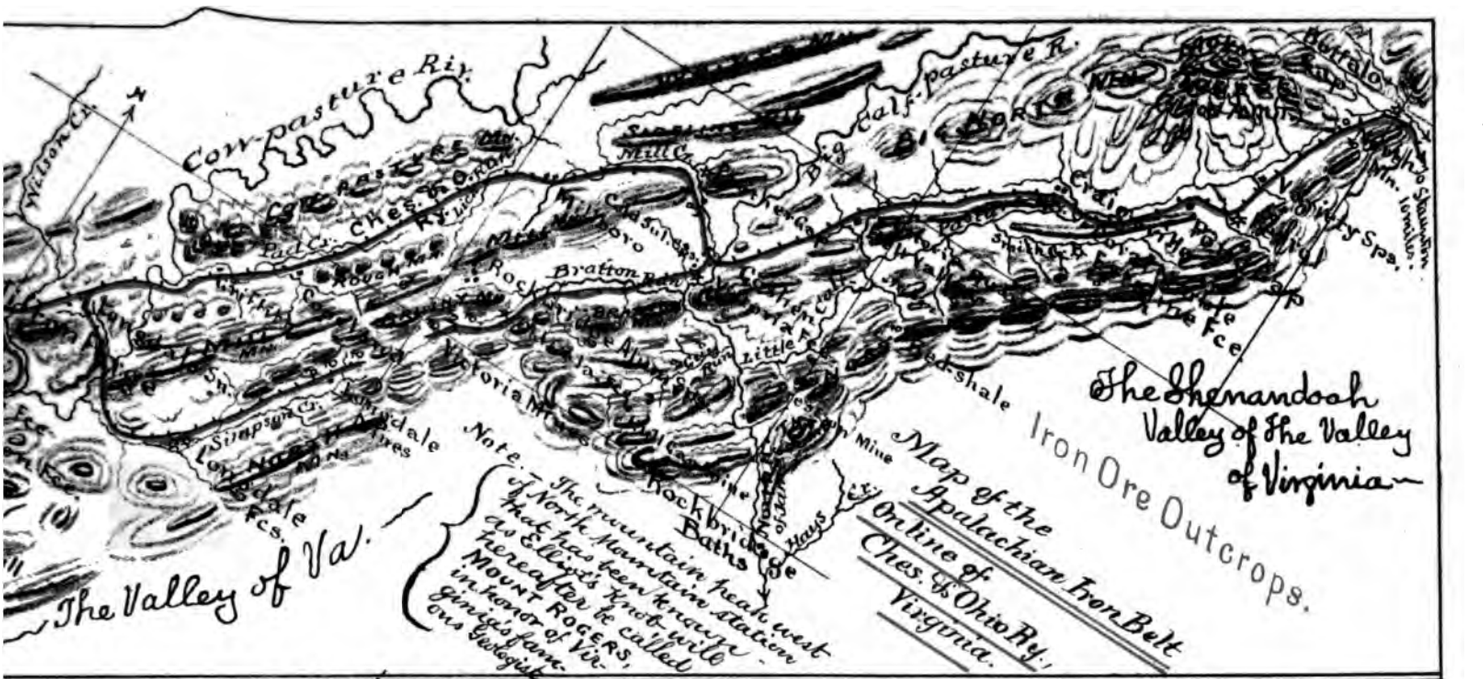
The Richmond city of the Midland escarpment, the old shore of the Tertiary ocean, is an oddly mingled but interesting picture from the station of the railway on the level of the Tidewater plain, and the traveler looks with curious interest upon this same earth-works crowned escarpment where he crosses the stream-valley of the Chickahominy, which it overlooks and commands, a few miles beyond Richmond. Along or near this Tidewater-Midland border, skirting or crossing the wide and fertile bottom lands of the South and the North Anna rivers of the Pamunkey, the railway runs, through the county of Hanover—one rich in memories of men and conflicts—until it reaches Hanover Junction and the higher level of the eastern border of Midland.

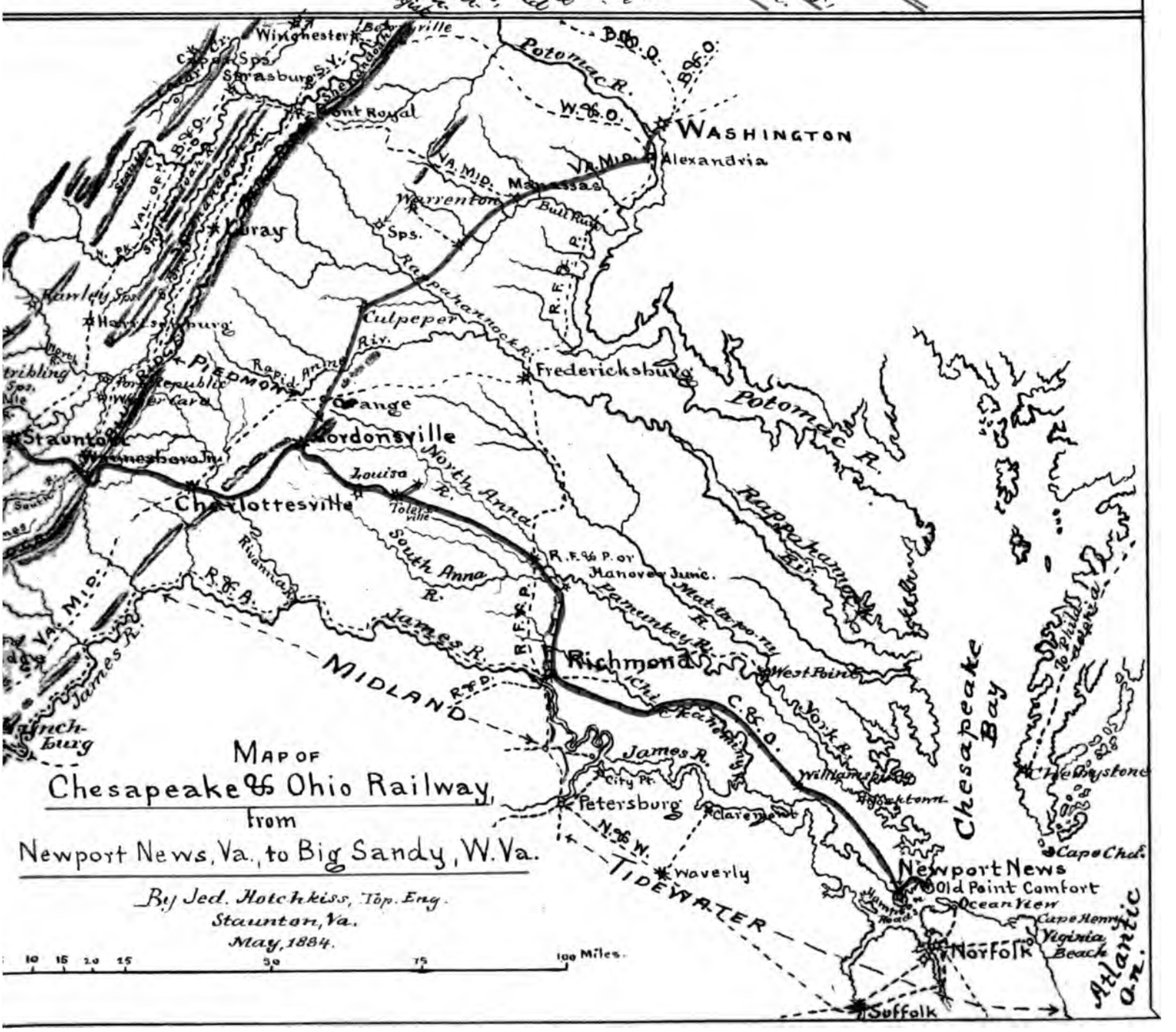
From Hanover Junction to Gordonsville the way is along the water-parting of the North and the South Anna rivers, ascending from 134 feet above tide level, by a gradual rise, to 538 at Melton and 498 at Gordonsville, and catching from near Louisa, on either hand, charming glimpses of the Southwest mountains of the Coast range, their distance and elevation exaggerated by contrast with the widely extended undulating Midland plain from which as a foreground they are seen.—The wide, solemn, forest covered landscapes of this region have a peculiar charm when thoughtfully dwelt upon, and nowhere are more remarkable atmospheric effects seen.

From Gordonsville to Shadwell the Midland side of the Coast range (Southwest) mountain is followed and only the beautiful sky lines and eastward slopes of this first-encountered chain of Virginia mountains attract attention and cause one to cease to wonder that so many men of note have had their homes upon their eye-entrancing slopes and crests,—homes from which appear in wide and grand perspective landscapes of rare and surpassing loveliness.

The gorge of the Rivanna is a tame but pleasing passing picture, for one delights after hours of dry land to again meet a full-volumed flowing river, but when by it the western barrier of Midland is passed and the traveler comes within the borders of Piedmont, at Charlottesville, he begins to realize that beauty in landscape is the peculiar property of a Piedmont region, one where the gradations of forms of relief have the almost endless variety found from winding stream-valleys


Map of
Louisa County, Va.
Pyrites Beds
By W. H. Adams M.E.
Victoria Furnace
Contrary Cr.
Sulphur Mines
Co. of Va.
Lennig
Arminius Mines
Mines Ru.
Tolersville
Chesapeake & Ohio R.R.
Scale of Miles.
Iron Pit
Scale 400' to 1'
Levels
Pyrites Vein
Ideal Section crossing Stratification at New slope Shaft of Arminius Copper Mines.
Geological Section from Contrary Cr. S.W.
Creek
Pyrites
Creek
Scale 1000' to 1".
a, Gold-bearing quartz. b, Clay slates. c, Talcose and steatite slates. d, Gravel, clay and silt. e, Pyrites Vein. f, Granitic slates.—
Jackson R.
Potts Cr.
Craig Cr.
Grave Fce.
Scale of Miles.
Autographed by Jed. Hotchkiss C.E. Staunton Va., May, 1884
James Riv.
Supplement to "The Virginias" May, 1884.
Ohio R.
TRANS-APALACHIA
Callipolis
Point Pleasant
Great Kanawha R.
Ironton
Huntington
C.&O.
Ashland
Elk R.
Charleston
Coalburg
Cauley R.
Hamks Nest
Meadow R.
Kanawha Falls
Mud R.
Coal R.
Big Coal
Big Sandy R.
12-Pole R.
Louisa
West Virginia
Kentucky
Guyandotte R.
Tug Fork
Pikeville
Prestonburg
Quinnimont
Meadow
Lewisburg
Alleghany
Clifton Forge
Covington
Warm Springs
Hot Springs
Aldersen
White Sulphur
Hinton
Indian Cr.
Red Sul.
New Castle
Roanoke Red Sul. Spr.
Roanoke
Pocahontas
Cranemouth
Princeton
Bluestone R.
New R.
Elkhorn
Grundy
Louisa R.
Russell Fk.
Pound Gap
N.&W.
New River
THE VALLEY


Map of the Appalachian Iron Belt
On line of Ches. & Ohio Ry.
Virginia.
The Shenandoah Valley of the Valley of Virginia
Iron Ore Outcrops.
The Valley of Va.
Corn-pasture Riv.
Calf-pasture R.
Ches. & Ohio Ry.
Bratton
Victoria
Shale
Rockbridge Baths
Note. The mountain peak west of North Mountain station that has been known as Ellison's Knob will hereafter be called MOUNT ROGERS, in honor of Virginia's famous Governor.


Map of
Chesapeake & Ohio Railway,
from
Newport News, Va., to Big Sandy, W. Va.
By Jed. Hotchkiss, Top. Eng.
Staunton, Va.
May, 1884.
10 15 20 25 50 75 100 Miles.
WASHINGTON
Alexandria
Manassas
Warrenton
Culpeper
Fredericksburg
Potomac R.
Rappahannock R.
Rapidan R.
Orange
Gordonsville
Louisa
Charlottesville
Staunton
Waynesboro
Lynchburg
Rivanna R.
North Anna R.
South Anna R.
James R.
Richmond
R. F. & P. or Hanover Junc.
Pamunkey R.
Mattapony R.
West Point
York R.
Chickahominy R.
Williamsburg
Hampton
Chesapeake Bay
Cape Chd.
Cape Henry
Virginia Beach
Atlantic Oc.
Newport News
Old Point Comfort
Ocean View
Norfolk
Suffolk
Petersburg
City Pt.
Claremont
Waverly
MIDLAND
TIDEWATER
C. & O.
N. & W.
R. F. & P.
Va. Mid.
B. & O.
Winchester
Strasburg
Front Royal
Luray
Harrisonburg
Staunton
Culpeper
Bull Run
Potomac R.

but four hundred feet above the sea level to great mountain domes that are more than four thousand.

The first glimpse of Piedmont fixes the attention of the lover of the beautiful in nature. The near is in soft and cultivated repose ; the distant is grand and strengthening.—Across Piedmont, by the stately buildings of Virginia's great University, through extensive and well tilled plantations and noble forests, among hills and along rushing waters, the railway winds until at Crozet it begins the long ascent of the western slope of the Blue Ridge, climbing to fourteen hundred feet above tide,and unfolding, as it rises,view after view, until at last one of the most beautiful landscapes in all the world—one of mountain and hill and valley, of forest and farm and hamlet—is spread before the delighted eye and stretches on either hand to the limits of vision. From Afton and its vicinity no one tires of the ever varying outlook.

The tunnel of the Blue Ridge—seven-eights of a mile through the old rocks—passed, a totally different landscape appears. The broad limestone valley of the Shenandoah, with its wide grassy fields and park-like oak forests, widens away to the north- and to the south-ward, and the Great North mountain of the Apalachians, its huge barrow-like back lifted more than four thousand feet above the sea level, fitly bounds the westward of this pleasing picture.

The 25-miles ride across this famous valley, by Staunton, its city-of-the-hills, incorporated in the Colonial days of 1738, adds charming details to the general ones of the first view, and when the Apalachians are entered by the gorge of Buffalo gap in Little North mountain, a backward glance across it to its distant Blue Ridge border will leave a vision that one would love to store in his treasure house of beautiful things to be remembered.

The transition from valley to mountain scenery is instantaneous when the Buffalo Gap defile of Little North mountain is passed and the rail turns sharply to the southward and begins the long series of zigzags by which, on easy grades, it threads the mazes of the Apalachian valleys and plays hide-and-seek with the great and greatly varied ranges of the Apalachian mountains (of which the Alleghany is but one) which here, and here only, attain to their greatest perfection of form and grandeur. The turn made the eye is at once arrested by the huge mass of Elliot Knob that for miles fills all the westward landscape towering upward to 4,500 feet above the sea plane, and even to 2.440 above the railway track when that at North Mountain station has climbed to 2,060 feet—the highest point of the rail between the Chesapeake and the Ohio—above the harbor of Newport News and into a climate, the result of elevation, such as belongs to a region 500 miles more northerly than that of the shores of that grand harbor. —If the tourist will but turn aside from North Mountain station and mount to the summit of this lofty dome, the highest of the Apalachians that has as yet been measured in the Virginias, he will be amply repaid for his toil by the magnificent panorama of landscapes that it reveals. If a mountain house were there few places would attract more of those that love to dwell for a time in the pure atmosphere and ennobling scenes of lofty heights.

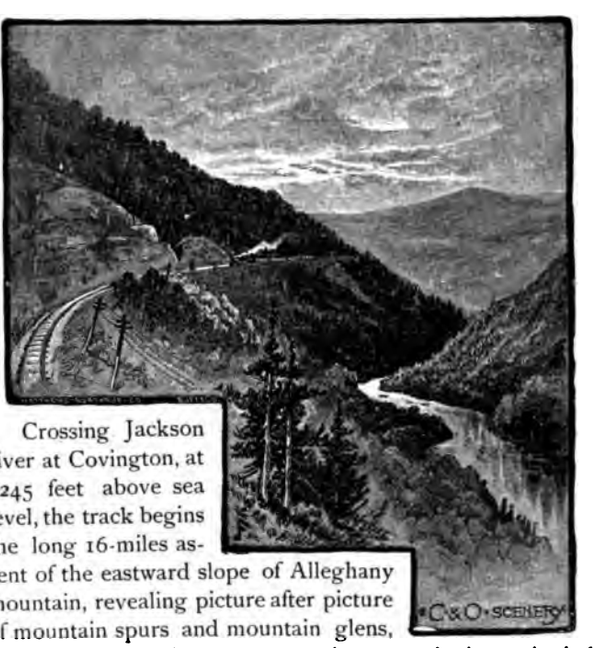
The numerous valleys of "the Pastures"—as the people call those of the Calf-pasture and the Cow-pasture rivers along which the railway runs—are pleasant to look upon all the way from North Mountain to Clifton Forge, especially when framed in the same landscape are the Bratton, Mill and Big North mountains, as from Goshen, or the Mill, and Walker and Warm Springs mountains, from near Millboro, or the Rough and Mill and Cow-pasture mountains from near Griffith, where the slaty pinnacles of the last named are features rarely found in the scenery of the Atlantic Highlands, and where Rough and Mill appear as real "serras" in their relief.

Jackson river is reached near Clifton Forge station, just where that river breaks through Rich-patch mountain exposing one of the finest mountain-sustaining arches of solid courses of natural masonry in the wide world. A short distance beyond this Clifton Forge water-gap—which our artist has selected as the first subject for illustration on this scenic railway—Jackson and Cow-pasture rivers unite and form the historic James, which in turn, a few miles further on to the east, breaks through the Big North mountain range, seen in the distance in the picture, in the wild Eagle Rock pass on the line of the Richmond & Alleghany Ry., which diverges from the C. & O. at Clifton Forge.

From Clifton Forge to Covington, the county town of Alleghany county, the railway winds along the romantic banks of Jackson river from which are caught charming glimpses of the Cow-pasture and other mountains that have been passed, of the Warm Springs and Rich-patch mountains on either hand and of the Peters and Alleghany mountains in the distant advance.

The Alleghany and its Eastward spurs ;—

From 1,690 feet above the Sea.



Crossing Jackson river at Covington, at 1245 feet above sea level, the track begins the long 16-miles ascent of the eastward slope of Alleghany mountain, revealing picture after picture of mountain spurs and mountain glens, clothed in mountain evergreens, picturesquely intermingled. The great rock beds of a half dozen geological formations, revealed by the huge cuts of the bed of the railway, add not a little to the bold features of these Alleghanian landscapes.

The Barriers of the Alleghany.

The Alleghany summit of the railway, 2,050 feet above tide level and 297 miles from Newport-news, is reached at Alleghany station; there the barriers of that water-dividing and moisture-gathering chain are passed by a tunnel and the traveler leaving old Virginia on one side emerges into new, or West Virginia on the other. Deeply shaded and romantic glens are found all along the waters that run from this station, especially on the pleasant road that leads away to the Sweet and Sweet Chalybeate springs, and the happy valley that embosoms them, to the eastward.

Leaving the waters of the James at Alleghany the railway begins its long and easy westward descent of 163 miles and 1460 feet along the bright and abounding waters of the Great Kanawha. Emerging into the mountain valley of Howard creek the famous White Sulphur Springs are soon reached, where that valley widens, in densely wooded hills and grassy intervales that enter into charming combination with the serrated crest and heavily ribed sides of the Alleghany and its spurs.

The Greenbrier is one of the prettiest of rivers and one never wearies in watching the moods of its clear green waters as the cars glide across its broad meadows or under the shadows of great walls, now of limestone and now of party-colored shales, or beneath the oaks and maples, that the generous soil of this noted grazing region produces.

Near Hinton the Greenbrier enters New river of the Great Kanawha, in all particulars the most wonderful of the rivers of the Atlantic Highlands, and the railway enters the 60 miles long cañon that river has trenched for itself, to a depth of 1500 feet, down into the rocky foundations of the Trans-Apalachian plateau.

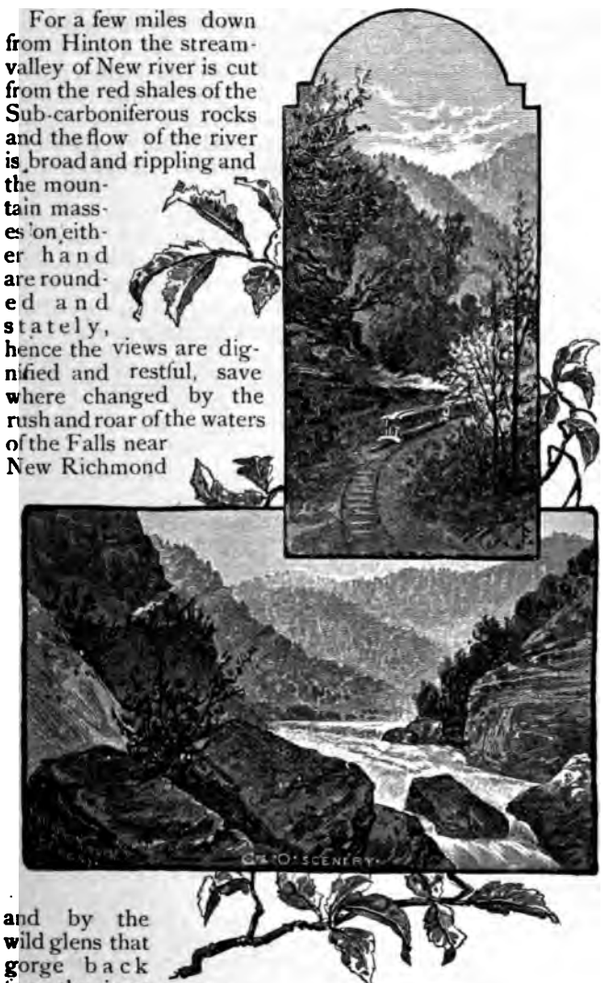
The tourist that will turn aside from the lines of the railway will find much to surprise and deeply interest him in the valley of New river and in its tributary lateral valleys above Hinton. Three miles from the railway at the mouth of the Greenbrier, Bluestone river enters New river from the Southwest by a gorge nearly 1 000 feet deep in the many colored beds—red, green, brown, purple, black, etc.—of the Upper Sub-carboniferous, and up the face of this great bluff winds the highway leading to Princeton, furnishing views that in massive wildness and depth of coloring may fairly claim comparison with the famous color-banded cañons of the Colorado. Ten miles further up Indian creek enters New river from the east; along the banks of that winding stream, a few miles from the Red Sulphur Springs, are scenes such as many an artist and tourist has crossed seas to find, as a study of our full page view on that picturesque stream will readily prove. Still further up, along the line of New River branch of Norfolk & Western Ry., is the only *through-cut* of the entire Apalachian system on the continent, one that will well repay a lingering visit.

New River just below Hinton is a majestic stream more than a thousand feet wide. It assumes the stateliness of a conqueror in a triumphal procession;

for from distant Carolina, from its head springs on Grandfather mountain of the Blue Ridge, six thousand feet above the sea, it has come and gathering the waters of thousands of square miles of mountains and valleys has broken its way through all the great mountain ranges of the Apalachians, and forced its way *into* the mountain system and *not* out of it, like the other rivers of the Atlantic Highlands, and here it pauses in front

of the Great Carboniferous escarpment for a time to enjoy its triumphs and gather strength for the final contest that shall open for it a way to the Father-of-waters and through that to the sea.

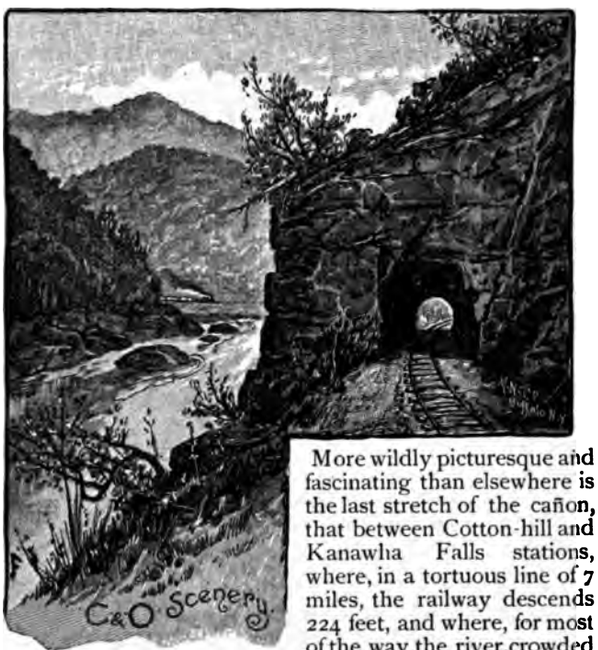
For a few miles down from Hinton the stream-valley of New river is cut from the red shales of the Sub-carboniferous rocks and the flow of the river is broad and rippling and the mountain masses on either hand are rounded and stately, hence the views are dignified and restful, save where changed by the rush and roar of the waters of the Falls near New Richmond and by the wild glens that gorge back from the river; but in an hour's ride the character of the scene is entirely changed; the great and hitherto placid river is turned on its edge and becomes a wild water-giant that with a sullen roar rushes to a titanic conflict with the huge boulders that the ages of elemental warfare have torn from the cliffs a thousand feet above and hurled into the pathway of the great river at the bottom of the cañon.



New River near Fayette.

Widely celebrated in pictorial literature, under the name of the Hawks nest or Marshall's Pillar (in honor of Virginia's great jurist), has become the grand cliff, over 700 feet in perpendicular height, that confronts the railway just below its only crossing of New river at Hawks-nest station, but this is only one, and by no means the most imposing of the precipitous "pulpit-rocks" of the Great Conglomerate that overhang the sides of this grand cañon and furnish salients from which to see or sketch long stretches of this strangely wonderful gorge, with its thousand feet walls of solid sand-rock masonry clothed upon with hanging gardens of primeval forest trees and streaked with gleaming lines of foamy waterfalls.

Pope's Nose Tunnel.



More wildly picturesque and fascinating than elsewhere is the last stretch of the cañon, that between Cotton-hill and Kanawha Falls stations, where, in a tortuous line of 7 miles, the railway descends 224 feet, and where, for most of the way, the river, crowded between precipitous walls, brawls and roars as it tumbles among the cragy boulders that fill its channel, save where it eddies, at sudden bends of its walled-in course, in lakelets of profound depth and alpine beauty overhung by strangely water-sculptured rocks, as where the "Pope's nose" tunnel looks out upon the "Blue hole."

The half-a-hundred-miles-long contest between the mighty waters and the massive elements-resisting rocks, ends near Gauley station, where the river bursts through the last and topmost westward sloping stratum of the Great Conglomerate, which it triumphantly over-rides, and again becomes a calm and majestic river, expanded to lake-like proportions, into which flow the limpid waters of the Gauley from the northward.

To the placid Gauley lake, gemed with tree-toped islands of great angular blocks of sand-rock, succeed the broad rapids of the united but as yet unmingled rivers, and these are followed by the Falls of the Great Kanawha—as the joined New and Gauley rivers are now called—where the river again asserts its mastery

A Corner at Kanawha Falls.

over the same Great Conglomerate rocks, this time breaking through them from above, as if to complete its victory, just before that great terrane disappears beneath the water-level, and the river, by a last grand and foaming leap, transforms itself from an impetuous, untamed and untamable mountain torrent into a broad, deep and serviceable river, one of the most valuable streams of the hundreds that help to make the twenty thousand miles of navigable water-ways of the Mississippi system.

Our artist stays his pencil where the torn rocks of the last barriers broken away overlook the Falls of the Kanawha, resting 408 miles from the Newport-news starting point and 672 feet above the sea-level—where the attractions of the surroundings demand and the comforts of the roadside inn make pleasant a longer stay.

Pyrites, etc., (continued from page 74.)

2¼ tons of ore mined and delivered (@ $1.50 per ton	$3.37
1¼ tons coal or coke (@ $3.50 per ton	4.38
Limestone	1.00
Labor, repairs, etc.,	3.00
Cost of one ton of pig iron	$11.75
Freight to tidewater,	.75
Total cost, delivered at tidewater	$12.50

In itself this statement is sufficiently striking to merit attention, in view of the fact that Northern states are quoting a cost of over $18 per ton as an average.

The success attending the enterprises first mentioned, and further south on the same general belt, warrant the belief that in the near future pig iron can be produced and sold on tidewater at a profit in the Southern states for about the cost of production in Pennsylvania.

As before remarked, the iron deposits of Louisa county are underlaid with sulphide of iron. I am led to believe that originally the entire deposit was pyrites, and that the subsidence of the waters or the elevation of the land gave opportunity for those changes on the surface which percolating waters and attendant chemical decompositions invariably produce. The physical structure of the veins, as already developed, clearly indicates that movements must have taken place after the formation of the pyrites, causing fissures, breaks, discolorations, etc. The cross section of the vein at the slope of the Arminius mines, on the accompanying plate, shows partially the forces exerted, but no adequate idea can be formed of the extremes of compression on the various strata without a personal inspection of the underground workings.

The pyrites is found at this mine 60 feet from the surface, and to the 150-foot level it is generally decomposed and granular in form, and permeated by water so heavily charged with iron and copper salts as to destroy pipes or tools in a few weeks. These waters have so far remained nearly constant in strength, and are evidently confined to distinct strata, as neither the foot nor the hanging slates yield other than pure water.

Geologically, these deposits lie wholly in the primary rocks, here consisting of gneisses and crystaline schists (micaceous, chloritic, and argillaceous), within a boundary inclosing, say, 3 miles in width by 10 miles in length, their course being generally northeast and southwest.

I cannot more correctly state the existing features of the district, mainly covered by the properties of the Sulphur-Mines Co. of Virginia and the Arminius copper mines, than by refering to the accompanying plate and by quoting Schönichen, who says, relative to Spanish and Portuguese mines (*Dingl. Journal*, clxx., p. 448):—"All the beds are within a belt of 5 leagues width by 30 leagues length. . . Prevailing rocks, clay slates and crystaline slates. Parallel to the granitic tract of the Sierra Morena, felsite porphyry and quartzite have broken through the slates, and only in the neighborhood of such dykes are the pyrites beds found. Their shape is that of large lenticular pockets in metamorphic clay slate, from 20 to 36 fathoms thick and extending to a length of 170 to 200 fathoms. The whole bed is filled with pure pyrites without appreciable gangue. These beds are found in a few places at 2 fathoms below the surface undecomposed and in a sandy condition, easily got by pit-work. In other places the zone of decomposition reaches from 10 to 50 fathoms downwards."

These features are observable in Louisa county as distinguished from any other deposit known to me in this country. In addition, the following table of analyses of ores from the several properties shows the most remarkable feature to be the absence of arsenic in every case, in striking contrast to ores from any other pyrites mines of magnitude in the world.

Analysis of Dr. A. Volcker, of London, June 30th, 1881.

Sulphur	48.02	Silica	7.60
Iron	42.01	Copper	none
Ferric oxide,	1.93	Arsenic	none
Sulphuric acid	.44		
			100.00

Analysis by Dr. W. H. Taylor, State Chemist of Virginia.

Sulphur	46.40	Arsenic,	none.

Analysis by Charles Tennant & Co., St. Rollax Chemical Works, Glasgow, June 3d, 1881.

Sulphur (dry) 50 per ct, or say Bisulphide of iron,	93.8 per c.	Copper,	none
Silicious matter	6.2 "	Arsenic,	none

Many analyses made in this country give results from 46 per cent to 51.5 per cent of sulphur, copper from 0.5 per cent to 9.72 per cent, traces of gold and silver, but *in no case has arsenic been found.*

The following table of analyses is presented to facilitate comparison with the best known foreign ores:

Mines.	Sulphur.	Iron.	Copper.	Lead	Zinc.	Lime and Magnesia.	Arsenic.	Insoluble.
Arminius Copper Mines	49.27	43.62	1.50	.....	0.38	1.32	.....	4.23
Sulphur Mines Co. of Va.	50.00	43.00	.....	.....	.....	....	.....	6.02
Wicklow, Ireland	38.79	36.06	2.57	1.80	.....	....	.39	19.71
Norway	47.55	41.92	.90	.....	1 26	3.38	.....	6.15
Rio Tinto, Spain	47.87	40.93	3.82	.62	.10	.19	.26	5 42
San Domingo, Portugal	46.00	43 50	3.10	1.60	.32	....	.30	5.18
Capelton, Canada	46.60	43.10	3.15	.45	.15	1.30	.15	5.10

The principal points to be established, in order to enlist capital in the proper development of such deposits, without which development there can be no benefit to the trade of the United States, are: 1st. Value of the pyrites; 2nd. Extent of the deposits; 3rd. Accessibility to markets.

Relative to the value of the material, I think scientific inquiry is fully answered by reference to the analyses already given, and commercially the burning of many thousands of tons for the production of sulphuric acid during the past ten years has demonstrated this point beyond any question. In this connection an eminent chemist, the manager of the largest alkali-works in great Britain, says: "There is no difficulty whatever in working Louisa county ore. It works much better than 'Tharsis pyrites,' *contains no arsenic*, and is, therefore, quite suitable for making pure acid for sale, and would replace for this purpose brimstone or Sicilian sulphur. Our furnace (Spence's mechanical shelf-burner) can do 25 per cent more work with this than with 'Tharsis ore,' and I should

be glad indeed, if we could obtain materials of this class for our purposes here."

The well-known German chemist, Mr. William Barsch, of the Fairfield Chemical works, a gentleman of wide experience in burning all classes of foreign ores, pronounces these "exceptionally free from scar or clinker, the cinders coming from the kilns in as perfect a form as when charged;" and adds, "They give less than five per cent 'smalls' or 'fines' in breaking to kiln-size, and do not decrepitate in firing."

Other disinterested testimony might be given, but is unnecessary, in view of the detailed analyses presented, and the fact that large amounts of ore are now being shiped to manufacturers of sulphuric acid, entering into direct competition with brimstone.

This may be shown practically as follows: One ton of brimstone (seconds) costs in New York $26.00, and contains 98 units of sulphur, or say 26½ cents per unit. Two and one quarter tons of Virginia pyrites delivered in New York cost from $6.00 to $13.50, and contain 98 units of sulphur saved, or, say 13¾ cents per unit.

These facts are yet too little known among our manufacturers and scientific men. They are so plainly understood abroad, however, as to have changed the trade in manufacturing acids within the last fifteen years. Already over the entire continent of Europe the price of acids, copper, purple ore, and even sodas is affected by the action of the combined pyrites-companies, who wield an influence equivalent to that of the oil-monopoly of our own country. There can be no possible competition between brimstone at its lowest obtainable cost, say $21 per ton in New York, and pyrites with an equal sulphur-product, easily to be obtained at $12.

Copper must eventually be a source of income from these deposits. There has already been, in a desultory way, some developing of the copper-bearing portions of the veins, resulting in sales of perhaps $60,000 value.

The general similarity of these ores to those of Rio Tinto, in Spain, would indicate that at a greater depth a part will be suitable for copper-extraction. The iron is, however, an element which in the near future must yield large profits.—By the "direct process" the residue, after the extraction of the copper and sulphur, can be converted into muck-bars at very low cost. This class of residual matter now sells readily in the markets, and will compete successfully with better grades of foreign ores.

The gold and silver that almost invariably accompany this class of pyrites, may be commercially valuable, but they have not yet been counted as factors of profit. Quartz-veins are found at varying distances from the main pyrites-veins, from which considerable gold has been recovered; and the beds of the creeks in the neighborhood have also furnished several hundred thousand dollars worth of wash gold during the last fifty years.

The extent of the deposits may be said to have been explored sufficiently to warrant contracts for, say 1,000 tons daily for many years to come. Machinery is now being put in, capable of delivering to the surface 500 tons daily, and when the branch railway is completed, reaching to the extreme end of the district, twice that amount can be delivered if required. The deposit shown in the accompanying plate, has the minimum width developed by either company mentioned, and will give a fair idea of the ease with which large quantities can be placed on the surface.

As to accessibility, it suffices to say that these mines are, in round numbers, 60 miles from tidewater at Richmond, and 135 miles from Newport News, Va. Both these cities are terminal points for the Chesapeake & Ohio Ry., and both are fited with coal-pockets, chutes, and all facilities for the transfer of ores direct to vessels. Especially is this the case at Newport News, where 20 to 40 feet of water are obtainable, and berths for six vessels at a time, at the coal-wharves alone. The situation of this port on Hampton Roads, a land-locked harbor for the vessels of the world, with no ice or dangerous channels, permits freight to be secured at all seasons for coast ports, with but one handling from the mines. Owing to this very favorable location, in proximity to cities of export for cotton and grain (the new elevator at Newport News stores 1,600,000 bushels of grain, and loads a vessel up to 100,000 bushels, inside of eight hours), it becomes possible for the Louisa mines not only to supply the trade at home, but to export the pyrites.

Liverpool is distant from Newport News 3,100 miles, Glasgow 3,500 and Havre or Bremen 3,400.

As ballast in cotton ships, ores can be shiped halfthe year for 2*s.* to 3*s.* sterling, as against 14*s.* from Huelva, Spain, to England. One-third of the cotton crop of this country last year was loaded at Norfolk and Richmond. This insures all the tonnage necessary to transport ores abroad at minimum freight.

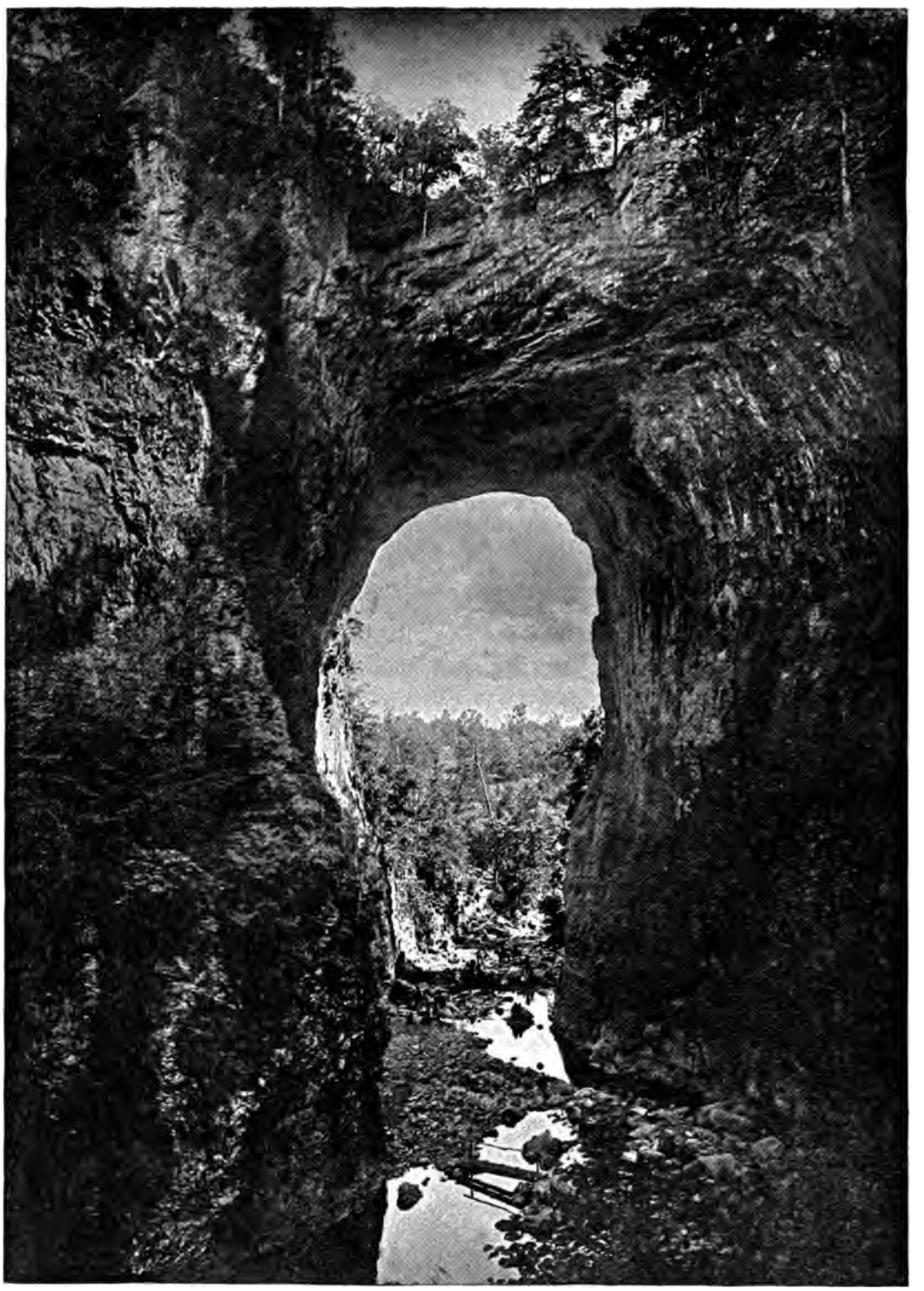
All inland cities, say within 500 miles of the mines, will eventually secure their supply of pyrites by means of railroads, in the same manner as coal or coke is now carried over long routes. The railroads are sure to underbid for this desirable class of freight, even to seaboard cities, if within a reasonable distance.

The Institute may expect to hear more of this new mining industry through the developments and legitimate operations inaugurated on a liberal scale by the present companies, which operations must redound to the credit of the state, setle within her borders a new and busy colony, and bring into direct consumption large quantities of minerals heretofore considered commercially valueless.

The Norfolk Terminal Company, as we learn from the report of President J. P. Kimball for the year 1883, is now engaged in the work of developing the fine propety it has purchased at Lambert Point, on Elizabeth river, north of Norfolk and nearer to Hampton Roads than that city. This property is some 325 acres of what is now land, besides the fronting waters out to the port-wardens' line which will add many acres more of land available for building purposes of various kinds. This gives a water-frontage of over 2 miles which must become very valuable, affording, as it will, ample space for the construction of docks, wharves, and other terminal facilities such as may be needed by the various railways terminating at Norfolk.

This report states that the Norfolk & Western Ry. Co will make the Lambert Point property the terminus of its already large and constantly increasing traffic, it having secured the right of way for a railway, now in course of construction, to connect its stations in Norfolk with that Point, and made contracts for the erection of warehouses, coal piers, etc., which it is expected will be completed and ready for use this summer. These improvements are being made in a permanent and substantial manner and so located as to permit the loading of vessels drawing 28 feet of water.—This company has also acquired stock in the Old Dominion Steamship company and barges for the transportation of coal, cotton, etc.

This report very truly says: The steady growth of shipments to and from Norfolk, the unequaled harbor facilities afforded and the improvements which are constantly being made, will undoubtedly attract and promote many new industries, so that the near future will give a growth and impetus to business to and from Norfolk which will probably make it one of the largest shiping ports in the United States, and will, of course, tend largely to increase the value of such a property as that of the Norfolk Terminal Company.



The Natural Bridge of Virginia, from the West.
From nature in 1883.

Location, Altitude, etc., of Stations of Chesapeake & Ohio Ry.—Below are given the stations of the Chesapeake & Ohio Ry. in Virginia and West Virginia, stating their locations in the natural grand divisions of these states and in the counties, also their distances from Newport News and their elevations above tide level.

1. In Tidewater Virginia.

Stations.	Counties.	Dis. from N. News.	Ft. above Tide.
Phoebus	Elizabeth City.	9.0	9.0
Hampton	"	7.2	3.0
Old Point Junction	Warwick,	1.3	17.4
Newport News	"	.0	17.4
Morrison	"	6.4	30.4
Oriana	"	12.6	25.9
Lee Hall	James City,	17.8	38.4
Grove Wharf	"	21.6	61.5
Williamsburg	"	26.6	65.9
Ewell	"	29.9	36.0
Kelton	"	32 7	122.4
Toano	"	37.0	100.8
Diascund	"	40.9	33.8
Lanexa	New Kent,	43.3	21.5
Providence Forge	"	51.3	28.7
Mountcastle	"	54.2	33.8
Roxbury	Charles City,	56.7	32.0
Elko	Henrico,	61.6	66.0
Fort Lee	"	67.8	155.15
Orleans Street,	"	73.2	32.8
Richmond, 18th Street	"	73.2	43.8
" Broad St.	"	75.0	29.0

2. In Midland Virginia.

Richmond	Henrico.	75.00	30
Brookland	"	78.00	160
Hunslett	"	80.50	100
Ellerson	Hanover.	81.25	106
Atlee	"	83.85	201
Ashcake	"	87.41	199
Peake	"	89.76	194
Cady	"	91.29	106
Hanover	"	93.24	82
Wickham	"	95.95	76
South Anna	"	97.76	68
Garnett	"	101.00	112
R. F. & P. Junction	"	102.54	134
Verdon	"	105.39	221
North Anna	"	107.00	244
Noel	"	108.34	254
Hewlett	"	110.38	276
Beaver Dam	"	115.06	282
Dawson	"	117.88	326
Bumpass	Louisa.	120.00	329
Buckner	"	121.94	321
Frederick Hall	"	125.21	348
Pendleton	"	130.00	473
Tolersville	"	131.31	461
Louisa	"	137.08	452
Trevillian	"	141.49	524
Green Springs	"	144.70	526
Melton	"	147.61	538
Gordonsville	Orange.	150.81	498
Lindsay	Albemarle.	155.69	477
Cobham	"	157.90	401
Campbell	"	160.83	348
Keswick	"	164.58	435
Shadwell	"	167.96	303

3. In Piedmont, Virginia.

Charlottesville	Albemarle,	171.81	451
Va. Mid. Junction	"	172.68	485
Ivy	"	179.30	516
Mechum River	"	182.26	550
Crozet	"	185.00	718

4. In Blue Ridge Virginia.

Stations.	Counties.	Dis. from N. News.	Ft. above Tide.
Greenwood	Albemarle.	189.95	1,226
Afton	Nelson,	194.71	1,377
Blue Ridge	Augusta.	197.91	1,352

5. In the Valley of Virginia.

Waynesboro Junction	Augusta,	198.40	1,320
Waynesboro	"	198.90	1,284
Fishersville	"	203.95	1,321
Brand	"	207.00	1,332
Staunton	"	211.38	1,387
LaGrange	"	214.50	1,620
Swoope	"	219.31	1,653

6. In Apalachian Va. and W. Va.

Buffalo Gap	Augusta,	222.26	1,885
North Mountain	"	224.50	2,060
Chapin	"	225.50	2,008
Variety Springs	"	226.97	1,905
Ferrol	"	228.33	1,812
Pond Gap	"	230.15	1,677
King	"	232.9	1,511
Craigsville	"	234.35	1,516
Bell Valley	Rockbridge,	239.34	1,507
Una	"	242.00	1,420
Goshen	"	243.44	1.410
Panther Gap	Bath,	246.50	1.590
Millboro	"	250.51	1,679
Mason Tunnel	"	252.39	1,550
Crane	"	256.50	1,361
Copeland	"	258.00	1,246
Griffith	"	261.00	1,165
Longdale	Alleghany,	264.70	1.150
Clifton Forge	"	267.62	1,047
Jackson River	"	270.07	1,035
Low Moor	"	271.75	1,155
Steele	"	275.07	1.210
Covington	"	280.41	1,245
Callaghan	"	2 5.86	1,427
Backbone	"	290.36	1,690
Trice	"	291.50	1,816
Alleghany	"	296.70	2,050
Tuckahoe	Greenbrier, W. Va	298.42	2,036
White Sulphur	"	302.15	1,920
Hart Run	"	305.90	1,814
Caldwell	"	307.60	1.765
Ronceverte	"	312.90	1,660
Fort Spring	"	319.32	1,625
Alderson	Monroe,	326.14	1,550
Mohler	Summers,	328.24	1,540
Greenbrier Stock Yards	"	334.00	1,530
Lowell	"	335.75	1,510
Talcott	"	337.50	1,510
Don	"	343.00	1,432

7. In Trans-Apalachian W. Va.

Hinton	Summers,	347.69	1.377
Barksdale	"	350.00	1.345
New Richmond	"	356.58	1.290
Meadow Creek	"	360.00	1,265
Glade	Fayette,	364.60	1,237
Quinnimont	"	369.26	1,196
Prince	"	370.00	1,192
McKendree	"	372.69	1,150
Stone Cliff	"	379.50	1,076
River View	"	380.70	1.072
Dimmock	"	382.46	1,045
Fire Creek	"	384.70	1,029
East Sewell	"	386.71	1,008
Sewell	"	387.81	1,004
Caperton	"	389.75	984
Nuttall	"	391.86	948
Fayette	"	394.25	908
Elmo	"	396.34	860
Hawks Nest	"	399.09	828
Cotton Hill	"	401.20	896

Gauley	Fayette,	406.00	708
Kanawha Falls	"	408.31	672
Loup Creek	"	412.18	647
Mt. Carbon	"	413.00	639
Frederick	"	416.09	641
Crescent	"	417.00	638
Cannelton	Kanawha,	417.69	636
Dego	"	421.50	.....
Paint Creek	"	423.15	622
Blacksburg	"	425.37	626
Coalburg	"	427.76	625
Winifrede Junction	"	431.10	616
Brownstown	"	434.83	608
Malden	"	438.53	665
Charleston	"	444.17	602
Spring Hill	"	449.85	600
St. Albans	"	455.91	594
Scary	Putnam,	459.69	590
Scott	"	463.56	683
Hurricane	"	469.55	683
Milton	Cabell,	476.17	586
Thorndyke	"	479 27	640
Ona	"	480.54	622
Blue Sulphur Springs	"	482.00	598
Barboursville	"	485.09	580
Guyandot	"	491.69	560
Huntington Shops	"	492.94	565
E. L. & B. S. Junction	"	494.00	560
Huntington	"	494.46	566
Ceredo	Wayne,	501.10	.....
Big Sandy	"	502.30	560

The Natural Bridge of Virginia.

By Charles Dudley Warner.

The most interestting picture in the dull waste of our old school geography—the interest in it being heightened by the association with Washington and Jefferson, and the wonderful climbing exploit narrated by Elihu Burritt—was the Natural Bridge.

The writer is glad to be able to report for himself that a visit to it did not dispel a single boyish illusion, and has to confess that pictures utterly fail to give any adequate idea of the grandeur of this freak of nature, or the noble beauty of the region of which it is only one of the attractions. We left the railway at a way-station one sparkling exhilarating morning and mounted the top of a coach for the drive of three and a half miles. The road, rising and descending, follows a small stream through cultivated hills, up a gradual ascent that at length brings us to an elevation of about 1.600 feet above tide-water. Here, in a slight depression among the hills, but commanding an extensive view, are the clustered buildings of the old and new hotels, capable of accommodating 300 guests. Above the hotel on one side is the splendidly wooded Mt. Lincoln, and on the other the open summit of Mt. Jefferson, from both of which the prospect is very extensive. A road crossing the stream before the hotel ascends a slight hill and passes over the Bridge, which is not visible from this point. The roadway is ninety feet wide, and protected by low bushes and evergreens on each side, so that the traveler could pass over it without seeing it, though the chasm is visible on either hand.

The Bridge is in fact thrown over a narrow deep chasm, something like a mile in length We descend to it by a steep path in the forest, passing on our way a very pretty cascade, and two of probably the largest arbor-vitæ trees in the world. Both are superb veterans, fluted and twisted, with branches broken and beaten in the storms of centuries, and the larger has a circumference of eighteen feet. Their age is estimated at fifteen hundred years. Reaching the bottom of the ravine, we come to the rocky bed of another stream, clear and shallow, and turning to the right the gigantic arch burst upon our sight, giving us a genuine shock of surprise. It is so massive, so high, so shapely, the abutments rise so solidly and spring into the noble arch with such grace and and power! We were not prepared for its majesty. The impression deepens as we advance and stand under it. Through the arch is the blue sky, over the top is the blue sky, great trees try in vain to reach up to it, bushes and vines drape and soften its outlines, but do not conceal its rugged massiveness. It is still in the ravine, save for the gentle flow of the stream, and the Bridge seems as much an emblem of silence and eternity as the Pyramids. A description says that it is wide enough to span Broadway and high enough to to throw a shadow over the spire of Trinity Church. Its span, I believe, is about sixty feet, and its height, including the thickness of the arch, is 215. The arch is quite regular, and both arch and abutments are smooth as if cut with a chisel. On one side, about seventy-five feet above the stream, are natural tablets or smooth surfaces, upon which are cut and scratched with sharp instruments hundreds of names. Among them is that of G. Washington. To ascend to this place seems a perilous and almost impossible feat. To reach it up the smooth rock from below is impossible. It was gained by working along from the side, where certain inequalities in the rock afford a precarious holding. I confess that this exploit gave me a new feeling about the "Father of his Country," as I saw him in imagination, in his stocking feet, clinging by his finger nails and eyelids, working along that perpendicular ledge, risking his life to carve in an inaccessible place his immortal name. But then he was not the Father of his Country when he did it. On the opposite face are names also, and very high up is the slight ledge where Henry Piper, the student whom Burritt has immortalized, attained in 1818, and from which he rescued himself by an almost incredible feat of climbing.

The rock of the Bridge and of the juting buttresses above is a superb study of color, scarcely equaled in any rock color I know for variety and beauty of tone. But one singular freak deserves special mention.

Exactly overhead on the highest spring of the arch is the figure of a gigantic spread eagle. It is the eagle of our coat of arms. The head, the spread wings, the claws with the arrows, all are perfect. It seems to be formed by discoloration of the rock rather than by lichen. However it is made —and it could not be more striking if it were painted—it is ancient. The French engineers who made a survey and measurement of the Bridge during the Revolutionary war, noticed it with wonder, and in their printed report they drew from it a happy augury of the success of the Americans in the struggle. What makes the figure itself more remarkable is that a discolored patch under it is a very fair representation of a crouching lion!

We followed up the ravine for a mile through a pine forest, in which is an astonishing variety of evergreens, to a rock basin filled by the foaming waters of a very pretty cascade. Returning to the upper air and the hotel, the owner of the Bridge drove us for an hour or two about his domain. He bought this place and retired to it for the benefit of his health. Being a man of fine taste, he fell in love with the region, and devoted himself to its development. The Bridge, with a small tract around it, was puchased for $40,000. To this he has added by subsequent purchases, in order to protect and retain the noble features of the scenery, hills and forest, until he is the owner of 2,000 acres. It may be safely called one of the most magnificent estates in existence. He has laid out walks and built roads through the forests and over and around the hills, forming extensive drives which in their windings lead amid lovely wood scenery and give lovely as well as far-reaching and magnificent views The soil is strong and rich, giving to the gigantic trees, oak, chestnut, tulip, etc., heavy and very dark foliage, while the hill slopes wave with luxuriant wheat and corn. From the gentle summit of Mount Jefferson we enjoyed a wonderful panorama, a vari-

ety of forest-clad hills and pretty valleys, the long ridge that separates the Shenandoah from the James, and the Blue Ridge, sharply defined, glowing in purple sunset colors, and stretching north and south for nearly one hundred miles in exceeding beauty. I suppose there is no where else so fine a view of this noble range.

What impressed us on our arrival and during our stay was the silence and peace of the region. With its pure air and smiling landscape the place seemed made for the repose of tired wanderers and sated sight-seers. No wonder that Jefferson loved it. A pretty cottage stands upon the site of the simple house that Jefferson once occupied. Near it are the remains of the cabin where two of his slaves lived and died. The origininal Bridge tract was granted to Jefferson by the King in 1774. After he was President he surveyed the place and made a map of it, and built him a log cabin for the slaves, Patrick Henry and wife, with two rooms, one of which he directed to be kept open for the entertainment of strangers.

The Chesapeake & Ohio Railway in 1883.

(Continued from page 69.)

The president's report wisely remarks: "Without underrating the important agricultural interests of the Virginias, it is apparent that their mineral attractions fit them to become abodes of great manufacturing industries. To develop these, however, will require capital, as well as labor, from outside sources. Both may be attracted, or repeled, by legislative discriminations."—He then proceeds to commend the policy of the Virginias for having abstained from hostile legislation towards railways.

Mr. Huntington's report truthfully says, that this railway "laid throughout with steel rails, well-drained and ballasted, challenges comparison with any other line of similar magnitude south of the Potomac or west of the Alleghanies;"—and we are prepared to say, almost any other line in the Union.

The proposed improvements of this year are: Additional terminal facilities at Old Point Comfort and Newport News, to accommodate the increasing health and tourist travel to these points; Extension of sidings west of Charlottesville which by being connected will make long sections of double track; and Assistance to new coal and iron enterprises by aiding in constructing branch railways to their locations.

This company now controls and operates the Elizabethtown, Lexington and Big Sandy and the Kentucky Central roads, in Kentucky, giving it connections with Louisville, Covington and Maysville, Ky., and Knoxville, Tenn.; it exchanges business with the Scioto Valley Ry. from Ashland and is in accord with railways leading to Chicago, St. Louis, and other important western centres of trade; intimations are made that it will eventually enter Cincinnati by a bridge of its own across the Ohio; and the president concludes by saying that "a continuance of the policy of development of local enterprises and increasing economy of management, point to a date in the near future when this company will, in addition to meeting all its obligations in money, as they mature, be able to accumulate a surplus for further additions to the property or for distribution among the stockholders."

The officers of the C. & O. Ry. for 1884 are: C. P. Huntington, president; A. S Hatch, vice-president; Wms. C. Wickham, second vice-president; C. W. Smith, general manager; Don A. Sweet, asssistant to the general manager; E. T. Tournier, secretary and treasurer; John Garrett, cashier; C. H. Hudson, superintendent of transportation; B. S. Fitch, general freight agent; H. W. Fuller, general passenger and ticket agent; T. L. Chapman, superintendent of motive power; and M. L. Lum, chief engineer. The directors are: C. P. Huntington, A. A. Low, A. S. Hatch, Elias S. Higgins, John Castree, Isaac E. Gates, A. E. Orr, Ezra Wheeler, and E. T. Tournier, of New York city, and Wms. C. Wickham, of Richmond, and John Echols, of Staunton, Va.

The report of General manager C W. Smith states that the gross earnings of this railway in 1883 were over 17 per cent more than they were in 1882, and that 11 per cent of this gain was from passenger and 18 per cent from freight earnings.

The tonnage of revenue freight moved during 1883 was 28 per cent more than in 1882. Of the revenue tonnage of 1883 not quite 15 per cent was through freight; of the 85 per cent remaining, 47½ was coal and 37½ other local freight. Of the through freight 54 per cent was east bound and 46 west bound; of revenue coal freight 95 per cent was east bound and 5 per cent west bound; of other local freight 49½ per cent was east bound and 50½ west bound.

Of the $3,081,032 revenue from freight traffic, 20 per cent was derived from through freight, 46 per cent from coal mined on the line of the road, and 34 per cent from other local freight,—so 80 per cent of the freight earnings of the road were from the country on its immediate line.

The average revenue per ton was $2.38 for through freight, $1.71 for coal, $1.59 for other local freight; an average of $1 76 on all freight. The average cost of hauling a ton of freight was .763 of one cent per mile, and the average net earnings on each ton were .241 of one cent per mile.

The tidewater shipments of coal in 1883 were:

From wharves at Newport News, 223,982 tons, consisting of: 110,120 tons of steam, 98,512 of gas, 7,699 of splint, and 7,651 of cannel coal.—One hundred and seventy-seven steamships were supplied with fuel coal during the year, at Newport News.

From James River wharves, at Richmond, 84,502 tons, consisting of 23,209 tons of steam, 37,531 of gas, 9,446 of splint, and 14,316 of cannel coal.

The principal exports from Newport News during the year were:

Grain,.....197,878 bushels for England and France.
Flour,.....132,371 barrels for Brazil.
Lard,..... 33,175 packages for Brazil.
Lumber.... 18,123 tons for England, Scotland, Germany, France, Spain and Portugal.
Whiskey, .. 11,356 barrels for Bermudas.
Cotton,..... 9,061 bales
Oil cake,.... 911 tons,
Tobacco, .. 18 hogsheads. } for Liverpool, England.

The passenger traffic increased 18 per cent over that of 1882; of the 572,572 persons carried, 89 per cent were local and 11 per cent through passengers. Of the local passengers about one per cent the most traveled westward, while of through passengers nearly 5 per cent the most traveled eastward. The average cost of carrying a passenger one mile was 1.7 cents, and the average net revenue for same was .67 of one cent. The average revenue per passenger was 2.37 cents per mile.

The largest net earnings of any one month of 1883 were in August, when the operating expenses were 58 per cent of the earnings; and the least net earnings were in January when the operating expenses were 84 per cent of the earnings. The operating expenses of the year were 65 per cent of the gross earnings.

The following exhibit of the tonnage of the various articles that were transported during the years 1882 and 1883 show what the freight traffic of this railway consists of and the changes during these years.

	Tons moved in 1882.	Tons moved in 1883.
1. Minerals.		
Coal	682,410	830,813
Iron ore	50,874	52,208
Other minerals	18,316	32,491
2. Manufactures.		
Coke	93,289	118,452
Pig iron	64,079	88,302
Flour	24,504	24,819
Salt	8,426	8,197
Whiskey	5,240	9,864
Tobacco	5,879	3,777
Lime and cement	3,779	3,762
Oil	3,242	2,787
3. Forest products.		
Lumber	112,206	135,275
Wood	22,307	26.250
Bark	2,941	1,263
4. Products of agriculture.		
Wheat	44,525	41,534
Corn	21,245	7,591
Other grains	3,160	3,895
Hay	11,350	11,186
Hemp	.....	2,245
Tobacco	10,231	18,228
Fruits and v getables	1,165	9,415
Cotton	863	2,999
5. Animals and products.		
Horses and mules	3,772	2,850
Cattle and calves	14,096	18,740
Sheep and lambs	1,429	2,420
Hogs	1,189	8,480
Bacon, lard, etc	10,223	13,851
Wool	893	2.430
Miscellaneous	147,142	264,552
Totals	1,367,475	1,748,677

The following is a statement of the tonnage sent from iron ore, pig iron and limestone stations during the years named:

	1882.	1883.
Tolersville	1,587	2,693
Bell Valley	4,698	9,650
Goshen	1,375	20.070
Copeland	...	558
Longdale	26,458	30 688
Clifton Forge	38.410	42,583
Low Moor	25,116	39,896
Backbone	13,319	2,498

All of these but one show very large increases in shipments during 1883.

The following table shows the comparative shipments, in tons, from a number of the coal mines stations in the years named:

	1882.	1883.
Stone Cliff	30,910	28,745
Echo	.....	9,753
Fire Creek	71,854	82,956
Sewell	35,347	41,157
Caperton	80,744	130,015
Nuttall	57,584	63 399
Elmo	....	12,465
Hawks Nest	82,521	85,820
Eagle	47,224	61,622
Frederick	32,434	27,064
Crescent	15,988	17,111
Cannelton	210,596	294,560
Paint Creek	17,323	21,088
Blacksburg	13,679	20,709
Coalburg	26,715	42,240
Winifrede Junction	2,855	1,270

All of these but three show large gains in 1883; the exceptions are points from which increased shipments were made by river.

The following statement shows the output and distribution, in tons, of coal and coke from the mines and ovens on the line of this road in 1882 and 1883:

Output.

	1882.	1883.	Increase.	Decrease.
Cannel coal	27,598	18,492	.....	9,106
Gas coal	308,844	328,569	19,725	.....
Splint and block coal	111,091	90,978	.....	20,113
New River steam coal	319,414	356,930	37,516	.....
Coke	82,071	88,687	6,616	.....
Totals	849.018	883,656	63,857	29,219

Distribution.

Fuel for Company's use	169,301	200,256	30,955	.....
Shiped at Hunt'gn on Ohio river,	44,228	15,791	.....	28,437
Delivered on line E. L. & B. S.	48,767	34,343	.....	14,424
" on line C. & O. except Richmond,	113,626	162,348	48,722	.....
" at C. Forge to R. & A. RR,	12,997	12,864	.....	133
" at Staunton to B. & O. RR,	642	85	.....	557
" at Waynesb'o to S. V. RR,	18,508	648	.....	17,860
" at Charlottesville to V. M. RR.,	49,483	52,476	2,993	.....
" at Gordonsville to "	78	.....	.....	78
" at R. F. & P. Junc. to R. F. & P. RR.,	6,807	5,073	.....	1,734
" at Richm'd for consumption of tugs, dredges, etc.	104,050	106,700	2,650	.....
Shiped at James River wharves	167,797	66,744	.....	101,053
Delivered at Newport News for consumption of tugs, barges, &c,	7,161	6,092	.....	1,069
Shiped at Newport News	105,578	220.188	114,615	.....
Totals	849,018	883,608	199,935	165,345

Material Development and its Helpers.—"The wonderful progress made in the last few years in developing the resources of our state has filled a chapter in her history which the early and steadfast advocates of internal improvements longed to see written. It was an earnest desire with them to behold the onward march of a progress which had its basis in the hidden wealth–now more than ever before known—coming forth from its hidden habitations throughout nearly every part of the first and most renowned of the old sisterhood of Commonwealths.

The Press has been the most constant, and we could with propriety say, the most efficient of all the means employed in attracting capital and energy for investment; under the firm conviction that the greatness of our natural wealth offered inducements in a degree far surpassing the most ardent contributions to the themes which called them into print.

In 1880 *The Virginias*, a monthly publication goten up in elegant style, was established in Staunton, by Major Jed. Hotchkiss, selecting the states of Virginia and West Virginia for its immediate field of work as a journal devoted to the development of the two states. To consult its pages is to learn how large has been the progress accomplished and to gain information of prospective designs. The ability and zeal of Professor Hotchkiss have called forth commendations from the highest sources. The writings, the maps, and the illustrated pages carrying the reader through all the difficult phases of research upon the face of the country, and to investigate the hidden values beneath it, are productions of a character not hitherto so accessible to the general reader. In these labors the editor is aided by many contributors—by learned and skilled cotemporaries in his profession—in geology and its kindred studies.

The April number brings forth old as well as new treasures in its department of literature. It has revived the illustrations of the Natural Bridge by the French engineers in 1782, and the description written by the Marquis de Chastellux, and, as an appropriate accompaniment, the great

curiosity sketched with its surroundings at the present time.

This is an enlightened and practical day too, in our progress. The resources of the state, and their development, interest hundreds now of our citizens, as compared to one who participated in such matters in the not very long past; and to all such *The Virginias* would prove a companion in its monthly visits, freighted with accurate and most valuable information."—*Lynchburg News, May 16th*.

List of Iron ore mines on Ches. & Ohio Ry.—The following list embraces, as far as we know, all the iron ore mines in Virginia, that, to this date, have been opened immediately on the line of the Chesapeake & Ohio Ry. or its branches. Those worked at this time are marked by a star.

1. Arminius,* near Tolersville, Louisa county.
2. Lennig, " " " "
3. Sulphur,* " " " "
4. Blue Ridge, near Blue Ridge, Augusta county.
5. Fishersville, near Fishersville, " "
6. Gibson. " " " "
7. Buffalo Gap, near Buffalo Gap, " "
8. North Mountain, near North Mn., " "
9. Ferrol, near Ferrol, " "
10. Esteline, near Pond Gap, " "
11. Preston, near Bell Valley, Rockbridge county.
12. Wilson, " " " " "
13. Condon, " " " " "
14. Victoria,* near Goshen, " "
15. Guy Run, " " " "
16. Panther Gap, near Panther Gap, Bath county.
17. Copeland, near Copeland, " "
18. Longdale,* near Longdale, Alleghany county.
19. Clifton Forge,* near Clifton Forge, " "
20. Callie,* " " " " "
21. Haynes, " " " " "
22. Low Moor,* near Low Moor, " "
23. Robertson, " " " " "
24. Alleghany,* near Covington, " "
25. Covington, " " " "
26. Rumsey, near Callaghan, " "
27. Stack,* near Backbone, " "
28. Kean,* " " " "
29. Trice,* near Trice, " "

Besides the above 29 Virginia iron mines there is a black-band iron ore mine on Gauley river, a few miles above Gauley station, W. Va., also the Terragenta black-band iron ore mine on Davis creek, connected with C. & O. by branch railway to Spring Hill station, W. Va.

The Kean iron ore mine has recently been opened, by Messrs. Keyser & McAllister, on the Kean property, not far from Backbone station of C. & O. Ry., Alleghany county, Va. A large body of fine ore has been uncovered, samples of which are now being analyzed by Dr. Froehling The "Alleghany Sentinel" states that the lessees of this mine are laying a tramway, 1.5 miles long, from it to the C. & O. Ry, and that they have made a contract to furnish Cameron & Sons, of Ironton, Ohio, with a large quantity of iron ore.

The St. Lawrence Boom & Manufacturing Co., of Ronceverte, Greenbrier county, W. Va., on line of C. & O. Ry., probably the largest lumbering establishment in West Virginia, (described on page 86 of *The Virginias*, for 1883), has made a contract with a Baltimore firm for its entire lumber product for this year, over ten million feet.

The Pocahontas mine explosion has been and continues to be the subject of discussion in mining and other journals and among those interested in coal mining. We have not now space at command to review the numerous letters and editorials that have come under our notice; to some of these, those having a responsible parentage, attention will be given hereafter. It is a matter for regret that there has been so much criticism based upon an assumption of facts and conditions not belonging to the case in hand. We have yet to see or hear of anything from anyone, competent to express an opinion, that has visited the mine since the explosion, that differs much from the "suggestions" as to some of the probable causes of the explosion that appeared in the March number of *The Virginias*.

We stated in our last issue that, at the request of the S. W. Va. Improvement Co., a committee had been appointed by the Am. Institute of Mining Engineers to investigate this explosion. As first named this consisted of Messrs. J. H. Bramwell, I. A. Stearns and S. M. Buck; Mr. Stearns could not attend on the day named, and his place was taken by Prof. Edward H. Williams, Jr., of Lehigh University, Pa., a gentleman of large experience in coal mining. This commission went to Pocahontas, and not only thoroughly examined the entire mine in which the explosion took place, but also a number of witnesses from among those who had worked in the mine. They concluded their investigation and reported on the 3d instant. No publicity has yet been given to this report; it will probably be read at the Chicago meeting of the Institute as it has been sent to President Bayles.

From what we can gather of the drift of the testimony of these thoroughly competent experts and the witnesses they examined (some of them the same miners we had questioned soon after the explosion), the flashing of powder smoke was a very common thing for the miners to do, throughout the mine, this often flashed back very suddenly, so much so as to lead to the conclusion that these gases of combustion were reinforced *to a very slight extent* by gas slowly given off (as is more or less always the case) from the large amount of freshly mined coal constantly exposed in this very actively worked mine; this and the fine dry dust of coal brought on the explosion, Only about one-third of the kegs of powder in the mine were exploded; many of the unexploded kegs, throughout the mine, were found badly chared on the outside. It appears, also, that a large proportion of the miners employed used twice as much powder as was needful in mining, thus keeping the mine unnecessarily hot and filled with the product of combustion.

This commission, as far as we can learn, found no evidence of the existence of natural fire-damp in this mine, except in almost inappreciable quantities, such, as is well known, is given off from nearly all freshly mined coals. We think it will be found that they will attribute the explosion to an accumulation of bad air,—the result of mining operations as conducted, reinforced by small quantities of fire-damp, from the freshly mined coal, as stated above, and from the incomplete combustion of excessive quantities of powder—which some reckless miner "flashed" in one of the rooms to an open keg of powder which exploded and caused a concussion that set in motion the intensely heated foul air and coal dust of the mine and caused them to explode, as a whole, in a moment, throughout the mine, a somewhat defective and irregular ventilation aiding in bringing about the catastrophe.

We shall wait with with great interest the appearance of the report of this commission, that we may know just what its conclusions were and on what they were based. The report, we hear, was a very full one, but is held open for further investigation which the commission has asked to have made when the mine is again in full operation.

Description of the Natural Bridge, called in Virginia, Rocky Bridge.

By the Marquis de Chastellux in 1782.

On my return from my journey in Upper Virginia, I regretted not having been able to take the dimensions of the Natural Bridge. I was anxious that some person, who was at once a designer and geometrician, should undertake an expedition to the Apalachians for that sole object, and that he should be provided with the instruments necessary for accomplishing it with accuracy. No man was more capable of this than the Baron de Turpin, Captain in the Royal corps of *Génie*; for in him were united all those branches of knowledge which are carried to so great a height in the corps to which he belongs, with the talent of designing with as much facility as precision; besides which, he was well enough acquainted with the English language to dispense with an interpreter. I proposed, therefore, to the Comte de Rochambeau, to charge him with this commission, which I was confident he would acquit with pleasure. The General thought that it would be rendering a fresh service to the Americans, to make them acquainted with one of the wonders which render their country celebrated, and that it would be pleasant enough for Frenchmen to be the first to give them a precise idea and a correct idea of it.

The Baron de Turpin set out, therefore, in the beginning of May, and in three weeks brought me back five plans, three of which are engraved and annexed to this work. Two of them present perspectives, taken from the two sides of the Natural Bridge, and from the bottom of the valley from whence it springs. The third is a bird's-eye view, and represents a part of the country in which it is. As to the dimensions, they are as follows, as given me by M. de Turpin:—

"The Natural Bridge forms an arch of fifteen toises (six feet, English) in length, of that species we denominate the *Cow's Horn;* the chord of this arch is seventeen toises at the head of *Amont*, and nine at that of *Aval*, and the right arch is the segment of an ellipse, so flat, that the small axis is only a twelfth of the large one. The mass of rock and stone which loads this arch is forty-nine feet solid on the key of the great centre, and thirty-seven on that of the small one; and as we find about the same difference in taking the level of the hill, it may be supposed that the roof is on a level the whole length of the key. It is proper to observe that the live rock continues the whole thickness of the arch, and that on the opposite side it is only 25 feet wide, in its greatest breadth, and becomes gradually narrower.

"The whole arch seems to be formed of one and the same stone, for the joints which one remarks at the head of *Amont*, are the effects of lightning, which struck this part in 1779; the other head has not the smallest vein, and the *intrados* is so smooth, that the martins, which fly around it in great numbers, cannot fasten on it. The abutments, which have a gentle slope, are entire; and, without being absolute planes, have all the polish which a current of water would give to unhewn stone in a certain time. The four rocks adjacent to the abutments seem to be perfectly homogeneous, and to have a very trifling slope. The two rocks on the right bank of the rivulet are 200 feet high above the surface of the water, the *intrados* of the arch 150, and the two rocks on the left bank 180

"If we consider this bridge simply as a picturesque object, we are struck with the majesty with which it towers in the valley. The white oaks, which grow upon it, seem to rear their lofty summits to the clouds; whilst the same trees, which border on the rivulet, appear like shrubs. As for the naturalist, he must content himself with such observations as may guide a more hardy philosopher to form some probable conjecture on the origin of this extraordinary mass.

From every part of the arch, and of its supporters, cubic pieces of three or four lines dimensions were taken, and placed successively in the same aqua fortis; the former were dissolved in less than half an hour; the others required more time, but this must be attributed to the diminution of strength of the aqua fortis, which lost it activity in proportion as it became saturated.

"We see that these rocks being of a calcareous nature, excludes every idea of a volcano, which besides cannot be reconciled with the form of the bridge and its adjacent parts. It is supposed that this astonishing arch is the effect of a current of water, we must suppose likewise that this current has had the force to break down, and carry to a great distance, a mass of 5,000 cubic fathoms, for there remains not the slightest trace of such an operation. The blocks found under the arch, and a little below it, have their interior positions marked on the collateral pendents on the side of Aval, and are occasioned by no other demolition than that of the bridge itself, which is said to have been one third wider. The excavation of eight or ten inches, formed in the *pied droit*, or supporter, on the left bank of the stream, under the spring of the arch, lengthens it into the form of a crow's beak. This decay, and some other parts which are blown up, give reason to presume, that this surprising edifice will one day become a victim of that time which has destroyed so many others."

Purchase of Virginia Iron lands.—On page 19 of *The Virginias* for '83 were published a map of and a report on the St. Mary iron lands, near the Shenandoah Valley Ry., Augusta county, Va.; these lands were sold at auction, in this city, April 28th, to settle some estates, and were purchased by Mr. A. A. Low of New York.—Mr. Low is one of the largest stockholders in the Low Moor Iron Co. of Virginia, and is a very large holder of Virginia and West Virginia iron, timber, and coal lands, and he is constantly adding to his possessions, his business sagacity, which it would not be amiss to call famous, teaching him that he can make no safer or better investments than in these lands at the prices at which they are now sold.

Tests of Pocahontas and Cumberland Coals by Shenandoah Valley RR.

We are indebted to General Superintendent Joseph H. Sands of the Shenandoah Valley Railroad, Roanoke, Va., for the following exceedingly valuable report, under date of May 21, 1884, of the results of tests recently made on that railway with the Lower measures or New River coal from Pocahontas, Va., and the Upper measures coals from the Hampshire & Baltimore mines of the Cumberland, Md., coal field.

Maj. Jed. Hotchkiss, Staunton, Va.

My dear Major:—We have recently made a trial on the Shenandoah Valley Railroad of the Pocahontas coal, furnished by the South West Va. Improvement Co., and some Hampshire & Baltimore coal, furnished by the Hampshire & Baltimore Coal Co. The result of these experiments may be of some interest to you, so I take pleasure in forwarding them.

The engines interested in this trial, are:

First:—Engine No. 22: a 10-wheel freight engine; 6 wheels coupled; diameter of cylinder 18"; stroke 24"; diameter of driving wheel 51"; area of fire grate 15½ sq. ft.; heating surface 804 sq. ft.; number of tubes 140; diameter of tubes 2¼"; length of tubes 12' 9"; smallest diameter of

shell 48″ ; wagon-top boiler ; 3⅛″ single nozzle ; diameter of stack 16″ straight.

Second :—Engine No. 44 : class, consolidation freight ; 8 wheels coupled ; diameter of cylinder 20″ ; stroke 24″ ; diameter of driving wheels 50″ ; area of fire grate 29.8 sq. ft. ; area of heating surface 1,482.5 sq. ft. ; number of tubes 174 ; diameter of tubes 2¼″ ; length of tubes 13′ 1″ ; smallest diameter of shell 56″ ; 3¼″ double nozzles ; diameter of stack at bottom 17.5″, tapering to 21″ at the top.

Third :—Engine No. 8 : class, 8-wheeler, 4 wheels coupling, passenger ; diameter of cylinder 17″ ; stroke 24″ ; diameter of driving wheels 63″ ; area fire grate 15.8 sq. ft. ; area heating surface 1,016 sq. ft. ; number of tubes 161 ; diameter of tubes 2″ ; length of tubes 10′ 10.5″ ; smallest diameter of shell 47″ ; 2⅞″ double nozzles ; diameter of stack 16″ straight.

General features of track :—Laid with 56-lb. steel on the Southern Division, over which the freight engines were tried; laid partly with steel and partly with iron on the Northern Division ; condition good ; the average curvature of the road is 4°10′ ; sharpest 10° ; two severe grades on the Southern Division on which the freight trains were tried are as follows: going north, grade 54.9′ per mile, 1,290′ with 7° curve; grade 79.2′ per mile 15,500′ 6° curve ; going south, grade 79.2′ per mile, 14,700′ 6° curve, and same grade per mile 17,390′ with an 8° curve.

Our inspector makes the following report concerning the coal used :

Pocahontas coal.—This coal makes a very bright, hot fire, cokes on the grate even when slack is used and but a small proportion is carried off by the draft ; it does not need much hooking up ; one trip was made on passenger engine No. 8 between Roanoke and Hagerstown, a distance of 239 miles, without a hook being put into the fire ; the trains never stalled for want of steam on the heaviest grades, and the engine threw much less fire than with the Hampshire & Baltimore coal. The injectors could be kept full on when climbing the grades without causing the steam pressure to fall and the steam pressure could be kept at blowing off point when the engines were working their hardest, without particular difficulty.

Hampshire & Baltimore coal.—This does not make such a hot fire as the Pocahontas coal ; there was always a dull, lurid appearance contrasting markedly with the white, hot hue of the Pocahontas coal fire. This Hampshire & Baltimore coal burns into holes and requires constant hooking and leveling ; the dust coal seemed to fly right off the shovel and out through the stack. With a light fire the coal seemed to be dancing on the grate, and would not coke as the Pocahontas coal did. The trains frequently stalled for want of steam on the grades, and it was invariably necessary to use the blower when the engines were pulling their hardest, and with freight trains it was no infrequent occurence for the engineers to have to stop on the grades to fill the boilers and get up steam pressure, and the use of the injectors would run the steam pressure down very rapidly. The engines all threw more fire when using this coal and the front end would generally be packed full of sparks at the end of the trip.

The amount of clinker made by both coals was about the same, the quantity being insignificant and easily crumpled in the hands.

The statements shown by tables No. 1 and No. 2, accompanying this letter, will, no doubt, prove very interesting to you. We are about making a further test of this coal on our Norfolk & Western RR. in competition with the Knoxville coal.

Truly yours,

Joseph H. Sands.

Tables No. 1.

1, Pocahontas coal.—The following table shows an average of the results of engine trials made in March, 1884, with Pocahontas coal on Shenandoah Valley RR. The trials were 8 with passenger and 24 with freight engines.

Engine 22.	Car miles.	Ton miles.	Lbs. coal per car mile.	Lbs. coal per ton mile.	Equiv't evaporation at 212° in lbs water per lb coal
Through Freight.	1812	44316	7.5	0.309	5.16
Local "	1992	39595	7.14	0.360	4.53
Engine 44.					
Through Freight.	2689	66687	4.99	0.202	10.05
Local "	2538	57929	5.12	0.235	8.91
Engine 8.					
Pass. Trains	779	20094	9.8	0.418	9.7

2. Hampshire & Baltimore coal.—The following table shows an average of the results of engine trials made in March, 1884, with Hampshire & Baltimore coal on Shenandoah Valley RR. The trials were 8 with passenger and 24 with freight engines.

Engine 22.	Car miles.	Ton miles.	Lbs. coal per car mile.	Lbs. coal per ton mile.	Equiv't evaporation at 212° in lbs water per lb coal.
Through Freight.	1989	39403	7.92	0.389	4.93
Local "	1756	38870	8.94	0.402	4.44
Engine 44.					
Through Freight.	2490	62955	6.54	0.274	7.85
Local "	2820	58919	5.80	0.285	7.17
Engine 8.					
Pass. Trains.....	779	20094	1.28	0.512	6.53

Average per cent of cinder and ash per ton of coal:

Engine 44.	Pocahontas..	4.98	Engine 44.	Hamp. & Balto....	7.40
" 8.	"	1.05	" 8.	"	1.47

These tables show the net coal used for the actual haul from coupling up to cuting loose, leaving out all coal used during lay-over ; the water-level, steam-pressure, and depth of fire on bars being practically the same at each trial when taking hold and leting go.

Tables No. 2.

1. Pocahontas coal.—The following table shows an average of the results of engine trials made in March, 1884, with Pocahontas coal on Shenandoah Valley RR. The trials were 8 with passenger and 24 with freight engines.

Engine 22.	Car miles.	Ton miles	Lbs. coal per car mile.	Lbs. coal per ton mile.	Equiv't evaparation at 212° in lbs water per lb coal
Through Freight.	1812	44316	7.98	0.326	5.16
Local "	1992	39595	7.59	0.385	4.53
Engine 44.					
Through Freight.	2689	66687	5.42	0.219	10.05
Local "	2538	57929	5.66	0.247	8.91
Engine 8.					
Pass. Train.....	799	20094	11.3	0.453	9.7

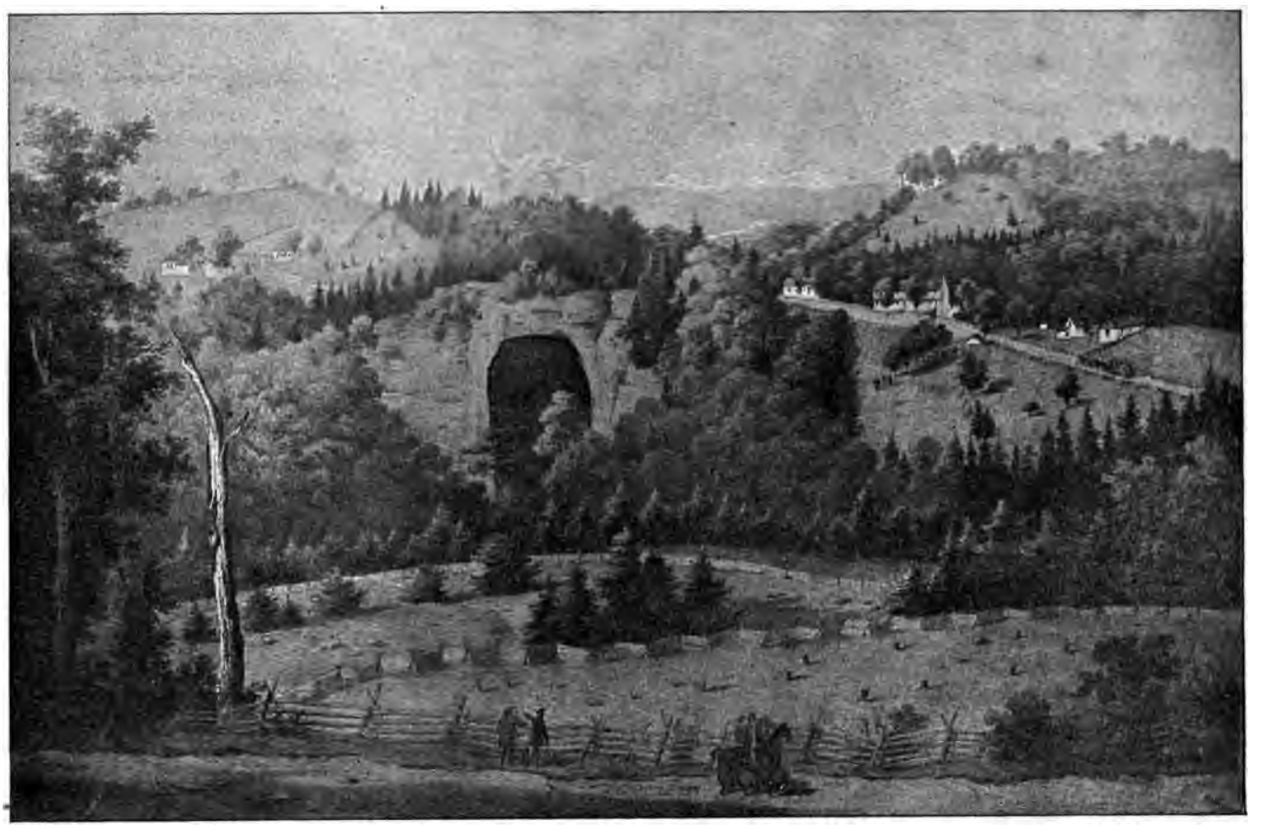
2. Hampshire & Baltimore coal.—The following table shows an average of the results of engine trials made in March, 1884, with Hampshire & Baltimore coal on Shenandoah Valley RR. The trials were 8 with passenger and 24 with freight engines.

Engine 22.	Car miles.	Ton miles.	Lbs. coal per car mile.	Lbs. coal per ton mile.	Equiv't evaporation at 212° in lbs water per lb coal
Through Freight.	1989	39403	8.31	0.394	4.93
Local "	1756	38870	9.29	0.419	4.44
Engine 44.					
Through Freight.	2490	62955	6.61	0.28	7.85
Local "	2820	58919	6.54	0.301	7.17
Engine 8.					
Pass. Train.....	799	20094	13.9	0.556	6.53

Average per cent of cinder and ash per ton of coal:

Engine 44.	Pocahontas..	4.98	Engine 44.	Hamp. & Balto..	7.40
" 8.	"	1.05	" 8.	" "	1.47

The above tables include the coal used in firing up and consumed in lay-overs when not excessively long.



The Natural Bridge of Virginia in 1857, looking North. — From Ed. Beyer's Album of Virginia.

The Natural Bridge, the most sublime of nature's works, though not comprehended under the present head, must not be pretermited. It is on the ascent of a hill, which seems to have been cloven through its length by some great convulsion. The fissure, just at the bridge is by some admeasurements, 270 feet deep,—by others only 205. It is about 45 feet wide at the bottom, and 90 feet at the top; this of course determines the length of the bridge, and its height from the water.

Its breadth in the middle, is about 60 feet, but more at the ends, and the thickness of the mass, at the summit of the arch, about 40 feet. A part of this thickness is constituted by a coat of earth which gives growth to many large trees The residue, with the hill on both sides, is one solid rock of lime-stone. The arch approaches the semi-elliptical form; but the larger axis of the ellipsis, which would be the chord of the arch, is many times longer than the transverse. Though the sides of this bridge are provided in some parts with a parapet of fixed rocks, yet few men have resolution to walk to them, and look over into the abyss. You involuntarily fall upon your hands and feet, creep to the parapet, and peep over it. Looking down from the height about a minute, gave me a violent head-ache. If the view from the top be painful and intolerable, that from below is delightful in an equal extreme. It is impossible for the emotions arising from the sublime, to be felt beyond what they are here; so beautiful an arch, so elevated, so light, and springing as it were up to heaven! The rapture of the spectator is really indescribable! The fissure continuing narrow, deep, and straight, for a considerable distance above and below the bridge, opens a short but very pleasing view of the North mountain on one side and the Blue ridge on the other at the distance each of them of about five miles.

This bridge is in the county of Rockbridge, to which it has given name, and affords a public and commodious passage over a valley, which cannot be crossed elsewhere for a considerable distance.

The stream passing under it is called Cedar creek. It is a water of James' River, and sufficient in the dryest seasons to turn a grist-mill, though its fountain is not more than two miles above. —*Jefferson's Notes on Virginia, 1781.*

The Natural Bridge of Virginia is called by Jefferson "the most sublime of nature's wonders." The interest it continues to excite. after the lapse of more than a century since the expression of that opinion, now that most of the world's natural wonders have become accessible by steam, indicates that Jefferson formed a proper estimate of the character of this great natural curiosity. The demand for our April number with its illustrations of the Natural Bridge has made it necessary to republish those illustrations, which we do on pages 73, 75 and 82 of this number, adding another, the one above, from a different point of view, showing the bridge and its vicinity as it appeared in 1857, when it was sketched by Mr. Ed. Beyer, a noted German artist of the Dusseldorf school, for his superb "Album of Virginia scenery." We publish in this issue the descriptions of the Bridge by Jefferson, Baron Turpin, and Charles Dudley Warner.—The Chesapeake & Ohio map shows the railway ways to the Natural Bridge and its inviting and well-kept hotels—the Forest Inn, the Appledore, the Pavillion, and the Bachelors' Lodge, all in chage of Mr. Eugene G. Peyton, the genial landlord. We may be pardoned for adding that a goodly number of Virginia mines are within easy reach of the Natural Bridge.

The Virginias.

Serial No. 54. Vol. V.—No. 6.

Staunton, Va., June, 1884.

Jed. Hotchkiss, Editor.

Western Pennsylvania vs. Great Kanawha, W. Va. coals.—We are greatly obliged to Mr. Arthur Kirk, president of W.Pa. river improvement association, for a copy of his letter, of May 27, 1884, to the Pittsburg chamber of commerce, complaining of "great injustice to Pennsylvania" in the appropriations of Congress for rivers and harbors,especially in the appropriations made for the Great Kanawha, compared with those for western Pennsylvania rivers. His complaint is based on a statement of the amount of internal revenue paid by 15 selected states compared with the amount paid by Pennsylvania,since 1863,compared with the expenditures for rivers and harbors in these states. We will suggest that he add Virginia, Kentucky, and some other revenue paying states next time to show their share of the same kind of "injustice."

The following extracts from this letter will interest our West Virginia coal operators in the Great Kanawha basin. After complaining of the "partiality" shown to West Virginia in the appropriations, it says:

"*The Kanawha is the principal stream* of West Virginia. It was originally a very worthless stream for navigation purposes, abounding with rocks, and subject to very sudden freshets, but runing through a very rich coal country. By large appropriations annually inserted in every River and harbor bill, it now has 3 locks and dams completed, and a site for a 7th dam bought and ready to commence puting in another dam. Two of these are movable dams, and by their use the coal men of the Kanawha river were able to make three runs of coal from the Kanawha in 1883,while our Pittsburg coal men could not move a boat.

By a clause in the River and harbor bill of 1882, no toll can be collected on the Kanawha river, but all coal passes out free; thus the coal men of West Virginia not only have the advantage of being 240 miles nearer to a market, but they have constant boating water nearly all summer, and can thus give their coal digers steady employment all the year, because they have no tolls to pay, while our Monongahela river coal men have to pay one cent per bushel tolls to get their boats through the locks of the Monongahela Navigation Co., and have 250 miles of the most dangerous navigation before they can get an even start with the coal men on the Kanawha. This great loss, it is needless to say, falls very heavy on owners and digers, but mainly on the digers.

The men who take their lives in their hands, and face all the dangers of 'diging dusky diamonds all the year round,' surrounded by all the dangers of *fire damp and mine accidents*, are thus year after year robed of their just wages by Congress voting such large sums to improve other places and doing so little for Pennsylvania.

While it is a great loss to our whole community to have this much business taken from us, it falls heaviest on our coal digers, because our shipers coming into competition with the coal men from Kanawha, can get but a fraction more for their coal than the Kanawha coal men, while their coal costs them (counting tolls on Monongahela river, delays on account of want of water, wrecks, and longer trips of tow boats,) not less than two cents a bushel more than shipers from the Kanawha. This, I said before, falls mainly on the coal digers of the Monongahela valley, because tolls must be paid, wrecks must be provided for, and expenses of tow boats from Kanawha and back must all be paid; and then, if the coal diger likes, he may dig coal for whatever is left, or let it alone. This, I think, is a great cause of the troubles with our coal digers year after year, and I think the best remedy for it is to have Congress act as liberally towards our Monongahela coal men as it has long been doing to the Kanawha coal men, and purchase the franchises of the Monongahela Navigation Co., and pass all boats through the locks free, as is now done on the Kanawha, and at the same time improve the Ohio by whatever may be the best plan, so that our coal men may have as near equal advantages with the Kanawha coal men as possible."

We are pleased to record this frank admission, by competent authority, of the advantages possessed by the Great Kanawha coal region, advantages which Western Pennsylvania coal miners and the Cincinnati coal dealers are always co-operating to overcome by *fixing* a higher price for W. Pa. coal that is really worth no more than the W. Va.

We agree with Mr. Kirk that the navigation of the Monongahela and other W. Pa. rivers should be well improved by the general Government and made free, puting all coal carrying rivers on the same footing, and leaving each the benefit of the advantages a beneficent Providence has given them. We are for free internal commerce and we are of the opinion that the representatives of West Virginia and most of those of Virginia are also, and that they will always be found voting for liberal appropriations for improving and making free all the really navigable rivers. Don't complain of the appropriations to the Great Kanawha as "partial," but join us in securing proper appropriations for all the rivers and harbors.

Cadmia or oxide of zinc deposits have taken place in tunnel-head or upper portion of the stack of the Low Moor, Va., furnace since it has been using for part of its stock iron ore obtained from the mine of the Alleghany Iron Mountain Co., necessitating at times a stoping of the furnace to break off these zinc accumulations from its throat. These deposits did not occur until the A. Iron Mn. ores were used. On page 43 of the 1881 vol. of *The Virginias* is republished, with illustrations, from the proceedings of the Am. Inst. of M. Engs. an interesting account of the large deposits of cadmia that gather in the tunnel-head of the Longdale, Va., furnace. In that account it is stated that no analyses that had been made of the ores or limestone used, had revealed the presence of zinc, but that it undoubtedly came from the ore. The same can be said of the ores used at Low Moor.

Seaside resorts in Virginia.—The Baltimore "Sun" says: "Cobbs Island is the only seaside resort in Virginia. The bathing could not be better. Shark fishing and snipe shooting are among the diversions. The island is reached from Old Point by steamer to Cherrystone. The Baltimore and Washington steamers make close connection with the steamer at Old Point."

What the "Sun" says about Cobbs Island itself is all right; but it is in error in saying that that is the only seaside resort in Virginia. Virginia Beach, east of Norfolk,and south of Cape Henry, is now daily entertaining hundreds of sea-bathers in the fine surf that rolls upon its beautiful beach uninterruptedly from the broad Atlantic; Old Point Comfort, too, with its Hygeia Hotel, and Newport News, with its Hotel Warwick, are generally considered, by the thousands that frequent those places, as seaside resorts.

A new fast mail for the South began its daily round on the 23rd of this month, from Baltimore by way of the Western Maryland, the Shenandoah Valley; and the Norfolk & Western railways and the lines from these to the South and Southwest.

This new daily fast mail train—for which we are mainly indebted to the efforts of General manager J. M. Hood of the Western Maryland—is provided for by a special appropriation made by the present Congress. As train No. 1 of the Wn. Md., it leaves Baltimore at 4:40 a. m.—late enough to take the morning papers of that city,—stops at but a few designated stations but exchanges mails with all, and reaches Hagerstown at 7:45, where it is taken by Shenandoah Valley train No. 3, for the South, at 8:05 (For continuation southward see S. V. and N. & W. time tables.) Returning by Shenandoah Valley train No. 2, from the South, it is taken by the Western Maryland train No. 10, at Hagerstown, 8:50 a. m. and delivered in Baltimore at 11:55 a. m.

This mail going south passes Waynesboro junction of C. & O. at 2:05 p. m., and going north at 3:04 a. m. If a close connection could be made at this point a large region could be given this fast mail by the Ches. & Ohio. Our people would delight to get the Baltimore papers some 3 hours sooner than they do now.

Weight of lumber.—C. G. Horton, lumber broker, of New York, in his Annual for 1884, gives the following as the weight per board measure foot, in pounds, of the woods named:

	Green.	Dry.		Green.	Dry.
Ash	4½	3½	Elm	4	3
Apple	5	4	Hickory	5	4½
Beech	5	4½	Holly	5¼	5½
Birch	4½	3½	Liguumvitæ	9	8½
Basswood	3½	2¼	Maple	5	4½
Chestnut	4	3	Mahogany	5¼	4½
Cherry	4½	3¼	Oak	5	4½
Cypress	4	3	Poplar	3½	2¼
Cedar	4	3	Walnut	4½	3½

Norfolk & Western RR.—The extensive improvements of this Co. for terminal facilities at Lambert Point, its Norfolk harbor terminus, are being pushed to completion for the fall trade. As shown in a bird's-eye view just published, these improvements consist of eight long piers, four of them fited with pockets, etc., for the coal trade, one with a grain elevator and large warehouse, one with a cotton compress and storage house, two for general purposes, and one wide pier, on the seaward side of the point, with stock yards and an abattoir. Provision is also made for a good hotel, for this Co. seems to always remember that men live, the majority of them at least, by eating.

An observation car, from Kanawha Falls up through the grand cañon of New river, along the charming valley of the Greenbrier, by the famous White Sulphur Springs, across the Alleghany mountain and through the Apalachian ranges, to Clifton Forge, is a new and most delightsome feature that the Chesapeake & Ohio Ry., without extra charge, attaches daily—between breakfast and dinner—to its east-bound Louisville and Washington express. Others of our railways can adopt this feature to their advantage. New charms are added to the scenery when viewed from this pleasant car.

Wire-fence telephone.—A correspondent of the Baltimore "Sun" suggests that by insulating one of the wires of the wire fences that are now becoming so common all through the country, all the farmers' houses could be placed in telephonic connection. A good idea if the details can be arranged.

Rochester city, N. Y., which has just celebrated its 50th year, was named from Col. Nat. Rochester of Cople parish, Westmoreland county, Va., who in 1800, with others, purchased the land on which that city now stands and started a town there. He was born Feb 21, 1752, on the plantation on which his father, grandfather, and great-grandfather had lived.

The immigration from Germany to the United States this year, is even larger than usual, and it is a fact worthy of note, that the emigrants are of a much better and more thrifty class of people than heretofore. They are mostly small farmers and artizans from southeastern Prussia. This is the class of people that could be very advantageously settled in the mountain country of Virginia and West Virginia, where there are large bodies of good but unoccupied land adapted to this class of people. If our railways would turn their attention to effecting such a settlement of these lands rather than to the sending of our own people westward, as they now do, we think it would be far more to their advantage, as it certainly would be much more to the advantage of these states.

The import of Iron ore into the United States during the year 1883 was 490,875 gross tons, valued at $1,207,991, or $2.46 per ton; of this Baltimore imported the largest quantity, 236,998 tons, valued at $2.50 per ton. The duty is now 75 cents per ton, consequently the cost of 60 per cent ore, at the average price of 1883, would be $3.25 delivered in Baltimore; the equivalent of about $2.17 per ton for the run of Virginia iron ores, or about $1.67 if no duty were paid. With no duty it is a pertinent question whether several of our furnaces, the railways co-operating, could not use foreign ores to advantage? We suppose the free-trader would say they should try it. The fair-trader, never.

Personals.—W. S. Hungerford, M. E. of Hadlyme, Conn., who has been professionally employed for some time in the Menominee range of the Lake Superior iron region, recently paid us a visit on his way to the Low Moor, Va., iron works, where he proposes to spend some time studying our Apalachian iron ore deposits.

Mr. Geiger, paleontologist of the U. S. Geological Survey, has returned to the Valley of Virginia. and is now engaged in this county, Augusta, collecting fossils, from the various geological formations that are here exposed, to be used in the future work of the geological survey in this region.—Mr. Geiger is an industrious collector and we have no doubt but that he will find here a large number of fossils. We hope he will have his eyes open and be quite certain to note how these fossils pass from one formation into another, for it is becoming to be well known that the range of ancient life was much wider in a vertical direction than it was formerly thought to have been.

Mr. Harry D. Campbell, assistant professor of geology and chemistry in Washington and Lee University, recently took the geological class of that institution on an excursion over the Richmond & Alleghany and the Chesapeake & Ohio railways, giving the students an opportunity for the field study of our Apalachian geology in the fine exposures of rocks that occur on these railways, and especially for coming to a clear understanding of the coal measures as exposed along New river. A day was spent visiting the Gauley Mountain mines, near Hawks-nest station, one of the best places in the whole country for examining a complete section of the number XIII or middle coal measures. Mr. Campbell has proven himself a first rate teacher of geology and chemistry, a most worthy assistant to his father, Prof J. L. Campbell.

Cincinnati Iron Market Report.–Under date of June 23, 1884, E. L. Harper & Co., send the following report, especially prepared for *The Virginias*:

There is no disguising the fact that business is dull. Though the rolling mills reached an amicable adjustment with their employees as to the wage scale, the large majority are closed down, some for repairs, others for want of sufficient orders to run. The foundries are generally making under their capacity. Their consumption is following behind production, and buyers are offered extremely favorable figures by the furnaces unable to pile their product. The suggestion that the furnaces ought to blow out and prevent additional accumulation is more easily suggested than carried out. With many to stop would be to "lie down," and while the protraction of the prevailing depression will necessitate "reorganization" in many places, hope inspires every maker to hold on with the expectation of the revival that "some day" must come. Were it not for the protection our tariff is affording us the crowded furnace yards of Great Britain would be quickly relieved in emptying upon our shores a sufficient amount of their cheap labor product to seriously increase our existing burdens. But the cloud has its "silver lining;" the low prices of crude iron is stimulating architectural building and railroad extension and equipment. The crop prospects are most flattering, and the grain traffic of the railroads means a general sympathetic and consequential improvement in merchandising; so that the prosperity of the railroads and the farmers must augment the welfare of the merchants and manufacturers of the country in general. The local trade is only moderate, and the following figures, at 4 months, indicate the prices current.

Foundry.

Virginia strong neutral coke No. 1, at	$18.00 to $18.50
" " " No. 2, at	17.00 to 17.50
American Scotch	18.00 to 18.50

Gray Forge.

Vrginia neutral coke	$16.00 to $16.50
Virginia cold-short	15.50 to 16 00

Car-wheel and malleable.

Virginia strictly warm blast	$22.25 to 22.75
Southern car-wheel coal blast	26 00 to 26.50
Hanging Rock cold blast	26.00 to 27.00

A Sanitarium for Consumptives some one is proposing to provide near Santa Fe, New Mexico. That will do very well for such unfortunates living in the far west, but we would call attention to the fact that the Blue Ridge region of Virginia is, as can be proven by the testimony of consumptives fully restored to health, the best sanitarium in the United States east of the Mississippi. The sheltered eastward slopes of 300 miles of the length of that mountain in Virginia, above the line of 1,000 feet of elevation above the ocean level and under that of 2,500, offer hundreds of localities for sanitaria for people afflicted with pulmonary diseases, that surpass any others that we know or have read of. During the past 36 years the writer has frequently recommended this regions to persons having such diseases, and in every case, where the advice was followed, a restoration to health has resulted. If any one is skeptical about the efficacy of Blue Ridge air, water, and exercise as remedial agents for lung troubles, let him spend a few months at the hearty hospitable, hostelry at Afton, on the Chesapeake & Ohio Ry., 1,377 feet above the sea level, and we will make him the referee to sustain the opinion here advanced. A young man from Vermont, a victim of this especially fearful New England diesase, took this advice and spent the winter of 1882-3 there, and went away with restored health that still continues. We could name other cases if necessary.—About the best thing such people could do would be to buy a few acres of the sunward dry-air slope of the Blue Ridge in Virginia, and busy themselves raising grapes and all kinds of temperate climate fruits while inhaling health and strength. We have at least 200,000 acres of such sanitary country for occupation, room for 20,000 people with 10 acres room for each, and none of it remote from railways or markets; and here, too, is the region for building up extensive establishments for health and pleasure that will have a large all-the-year-round patronage.

The Trans-Flat top Land Association, which has become the owner of large tracts of coal and timber lands on the head waters of the Guyandot and Coal rivers, in Wyoming, Raleigh, Boone and Logan counties, West Virginia, is having a complete topographical survey made of its lands by M. A. Miller, C. E., and a number of assistants. These surveys will furnish a complete topographical map of nearly all of Wyoming county and parts of adjacent counties. Lines of levels will be run along the principal streams and ridges so that the outcrops of the Lower measures or Flat-top coal beds of that region can be accurately located, and a contoured map be made.

Mr. Miller has been for many years in the employ of the Ches. & Ohio Ry. Co., as its land engineer, and has had a very large experience in railway and other surveys. He is, beyond question, the best engineer in the country to disentangle and adjust all questions in reference to large surveys in Virginia and West Virginia which have become badly mixed in their titles in consequence of the vicious system, or no-system, of land surveying that has prevailed from the first in these states. The territory that this survey will cover will embrace between 300 and 400 square miles, and the result will be a very important addition to our knowledge of the topography and of the mineral, forestal and other resources of this region, the larger part of which is still in a state of nature.

Many small industries.—Prof. Waterhouse, of Washington University, in an address before the National Convention of Fair and Exposition Managers, in St. Louis, gives the true source of national success. In speaking of France he says: The industrial greatness of France springs not so much from the products of a few great staples as from an almost infinite variety of small wares. The aggregate value of the innumerable little articles which France manufactures startles the statictician and enriches the nation.

That which makes France strong in this respect will afford power and strength to any country. It does not pay to put all one's eggs in a single basket. A short time since a party representing a large manufacturing firm, in speaking of the depression in trade, remarked, that while his establishment was selling its staple productions at low cost, it was enabled to declare fair dividends out of the profits of several special but much less prominent lines of manufactnre. Had this concern been confined to making one or two articles it could not have been run without loss. It is so with a country. If it be devoted chiefly to agriculture, every bad harvest brings universal suffering. If it be devoted to producing a few articles of manufacture, when the market for these fails universal bankruptcy ensues. The policy of France is a wise and beneficent one. It is a policy worth studying and imitating. While the United States are favored with a great variety of manufacturing enterprises, there is abundant room for very many more, particularly in the smaller lines, such as France cultivates with such great profit.

The Baldwin-Augusta Fair will hold its annual fair, this year, on its fine grounds near Staunton, Va., October 14, 15, 16 and 17. It offers a large list of premiums.

Statistics of Virginia's Iron trades in 1883.—We are indebted to Mr. James M. Swank, Secretary of the American Iron & Steel Association, for his annual report for 1883, with statistics of the American and foreign iron trades, presented to the members of the association May 1, 1884. The tables of this report are models of fullness and accuracy of details. They fully answer all questions likely to arise for information concerning the subject matter of this report, and yet they are embraced in the compass of a hundred elegantly printed pages.

The following figures are given for the products of the iron trades of Virginia during the year 1883, in net tons.

Charcoal pig iron produced	16,879
Bituminous coal and coke pig iron produced	136,028
Total production of pig iron	152,907

In the production of charcoal pig Virginia ranked 10th among the states; in that of coke pig 4th; and in total production 7th. Of the states that increased their production in 1883 Virginia came next to Pennsylvania, having increased her product from 87,731 tons in 1882 to 152,907 tons in 1883.

Of the 13 new blast furnaces built in the U. S. in 1883, four were built in Virginia and one in West Virginia.

The condition of the furnaces of Virginia at the close of the years 1882 and 1883 was:

	1882.	1883.
Number in blast	15	12
" out of blast	23	30
Total	38	42

Neither iron nor steel rails, Bessemer steel ingots, nor any other kinds of steel were made in Virginia during 1883.

In the production of rolled iron Virginia occupied the 12th place among the states, producing as follows:

	Net tons.
Bar, rod, bolt, hoop, shaped, etc., iron made	22,687
Cut nails made, 161,279 kegs	8,064
Total production of rolled iron	30,751

Virginia produced neither plate nor sheet iron, except nail plate, in 1883. In the production of rolled iron proper her rank was 10th, and in that of nails it was 9th.

The production of pig iron of all kinds in Virginia for the years named, in 2000 lbs tons, was as follows:

1880	29,934	1882	87,731
1881	83,711	1883	152,907

The production of each kind of pig made in the same years was:

	Charcoal.	Coke.
1880	14,043	15.891
1881	19,038	64,673
1882	26,133	61,598
1883	16,879	136,028

This shows that a most remarkable change has been made in the kinds of pig iron produced by the introduction of coke as a fuel, a change that will continue to increase from year to year with the increased production of coke.

The Virginia production of rolled iron for the years named, in net tons, was:

1880	31,441	1882	31,554
1881	33,984	1883	22,687

These figures show how sadly deficient this state is in establishments for converting pig iron into more valuable forms. Its iron industry will never prosper as it should until home markets are secured for much of the pig iron product of the state.

The production of cut nails, in kegs of 100 pounds, for the years named, was:

1880	123,728	1882	169.806
1881	127,566	1883	161,279

Virginia produced only about 1-46th of the nails made in the U. S. in 1883, while Pennsylvania produced nearly one-third of the product. There is no reason why Virginia should not produce as many as Pennsylvania does.

New Collieries in the Flat-top coal field are now being opened and by the close of this year, by the time when the Norfolk & Western railway shall have completed its terminal facilities at Lambert Point, near and north of Norfolk, for handling and shiping expeditiously a large amount of coal, in fact have ready a first class coaling station, as it will in the early autumn; Flat-top coal operators will be ready to supply a large demand.

The Norfolk and Western RR. is now engaged in extending its New River division some 4 miles down Bluestone river, into Mercer county, W. Va., along the lands of the Flat-top Coal Co. and the eastern outcrop of the No. 3 or "big bed" of coal, the same worked at Pocahontas, a few miles to the southwest. On this extension the following leases have, up to this time, been made by the Flat-top Coal Co., as we learn from its Superintendent, J. H. Bramwell, M. E.:

1. To Wm. Beury & Cooper, from the New River coal-field on Ches. & Ohio Ry., who have leased 275 acres of the "big bed," on Mill creek.

2. To Robert Goodwill and John Freeman, the latter also from the New River region, 275 acres of the "big bed" on Caswell fork of Simmons creek.

3. To Simmons Creek Coal & Coke Co., parties from the anthracite coal region of Pa., 200 acres of "big bed" on Simmons creek.

4. To other parties from anthracite coal region of Pa., 254 acres of "big bed" on Simmons creek.

These leases, on a royalty of 12½ cents per ton, cover about 1000 acres of the lands of the Flat-top Coal Co. These four collieries and those of the S. W. Va. Improvement Co., will, by the end of this year, be able to supply from 2,000 to 3,000 tons of Flat-top coal a day, so the Norfolk & Western may confidently expect a coal and coke traffic of not less than 750,000 tons in 1885.

Other parties are negotiating for leases, and the indications are that the railway will be at once extended down to and up Crane creek to where coal bed No. 3 is found to furnish a hard coal, one that will bear distant transportation for grate purposes, for which it has many advantages.

The Louisville, Ky., Board of Trade sends us its 5th annual report, that for the calendar year 1883. This volume is full of information concerning the trade of that important city, together with a large amount of information valuable for reference in every portion of the country. The tables and statistics show that the trade of Louisville is increasing in a most satisfactory manner from year to year. The details are given for the years from 1879 to 1883, inclusive. The suggestions of these tables are especially interesting to us in Virginia at this time, since a great deal of the export trade of that city is now moved through Virginia, either over the Chesapeake & Ohio or the Norfolk & Western railway systems. We shall make some of these tables the subject of future comment for the benefit of the mercantile, mining and manufacturing interests of the Virginias.

Poultry in Virginia in 1880.—The "small industries" of the country, as they are generally called, received more attention in the census of 1880 than in any of the nine previous statistics takings of the United States One of these treated of, for the first time in the census of 1880, was poultry and eggs, an attempt having been made to ascertain the number of barn-yard and other fowls in the country, on hand June 1, 1880, exclusive of the spring hatching of that year, and the number of dozen eggs produced during the year 1879. It is needless to say that it is impossible to obtain correct figures of numbers and quantity in such a matter as this in any country, much less in such an unmethodical country as ours; and yet the returns given, as the result of the inquiries of the census takers, have an approxmiate comparative value that is worth the effort made to obtain them.

The following table shows the returns of poultry and eggs for Virginia, by grand divisions, compiled from the 1880 census returns for *The Virginias.*

	Numbers of Poultry on hand June 1, 1880. Barn-yard.	Other.	Dozens of eggs produced in 1879.
Tidewater	465.875	151.374	2,054,075
Midland	419,904	139,352	2,060,771
Piedmont	357.779	96,439	1.825.903
Blue Ridge	63,225	21,030	265 409
The Valley	433,671	109,571	1,845,071
Apalachia	210,721	118,509	657,786
Trans-Apalachia	25,923	12,168	99,811
Totals	1,977,098	648,443	8,808,826

The following table shows the average yield, in dozens, of eggs to the fowl, on the supposition that the barn-yard fowls produced all the eggs returned, in each grand division of Virginia and in the state.

Tidewater	4.4	The Valley	4.3
Midland	5.0	Apalachia	3.1
Piedmont	5.4	Trans-Apalachia	3.8
Blue Ridge	4.2		
		Virginia	4.7

On page 21 of the census volume of Statistics of Agriculture are the following remarks on the poultry and eggs returns:—"Probably few persons appreciate the importance of the contribution to the annual production of wealth by the common barn-yard fowl. The statistics of poultry and eggs were gathered for the first time, by the census of 1880. This is a subject to which the limitations of a popular statistical enumeration, already noted in these remarks, apply with special strictness; yet there is no reason to doubt that the figures approach the facts in the case for the country as a whole, and exhibit with great accuracy the relative importance of this interest in the several sections and states.

The number of barn-yard fowl reported in the census, exclusive of spring hatching, was 102,272,135; of other fowl 23,235,187; the number of dozens of eggs, 456,910,916. At 12 cents a dozen, certainly a moderate estimate, the annual value of the egg product to the farmer would reach nearly $55,000,000; while we may suppose 150,000,000 to 180,000,000 pounds of meat sold annually out of the stock of fowls reported.

The geographical distribution of the poultry industry is very wide. There are 27 states which report more than 1,000,000 of barn-yard fowls each; 17 which report more 2,000,000 each; 13 which report more than 3,000,000 each; 7 which report more than 5,000,000 each, viz, Illinois, Indiana, Iowa, Missouri, New York, Ohio and Pennsylvania.

The proportion between the number of fowls and the egg crop varies greatly as between states and sections, and not without a manifest reason. If, for the purposes of this comparison, we suppose all the eggs reported to have been produced by the barn-yard fowl alone, we shall have the average production of eggs to each fowl varying from 3 dozen a year upwards to 4, 5, 6 and 7 dozen. It will be observed that in New England, with its system of mixed farming and its great number of commercial and manufacturing towns, affording local markets seting a high price on the product, and thus making it worth while to feed hens expensively with a view to increasing the yield of eggs, the number of dozen per year rises to a miximum, whereas in some states poultry seems to be kept mainly for the sake of the flesh.

Thus we have in these states the following yield in dozens per fowl:

Connecticut	7.1	New Hampshire	6.9
Maine	7.5	Rhode Island	6.4
Massachusetts	7.2	Vermont	5.9

Compare with these figures the average yield of eggs per fowl in the following states:

New York	5.0	Kentucky	4.4
Pennsylvania	5.2	Tennessee	4.7
Ohio	4.9	North Carolina	3.6
Illinois	3.6	Alabama	3.3
Indiana	5.0	South Carolina	3.1
Iowa	4.3	Louisiana	3.0"

The above figures show that Virginia ranks well in egg production with all the states except the New England ones. As a rule our producers get the benefit of the best prices, since at the seasons of the year when eggs are most in demand our climate has advantages for their production.

Adopting the price of 12½ cents per dozen, the egg product of Virginia in 1879 was worth $1,101,103. The 2,625,541 fowls of the enumeration were worth at least 25 cents each, or $656,385 for the whole number. So the value of the poultry and eggs of the state is not less than $1,750,000 a year; and this could be more than doubled if our people would avail themselves of the advantages of their climate and location in reference to the great consuming centres of the country. We have too few people making the raising of poultry and eggs a regular business.

The Luray Inn, delightfully situated, about 150 yards from the Luray, Va., railway station of the Shenandoah Valley RR., is, in reality, a most inviting summer resort. Built in the Queen Anne style, in the midst of ample and well-kept grounds, on a pleasant elevation that commands a wide and varied valley and mountain landscape, but a mile away from the famous and much visited Cavarns of Luray, and in the immediate vicinity of that thriving village, it offers many attractions to those that would rest in quiet and well provided places. Mr. George K. Mullin is the proprietor of this Inn, as he is also of the "Hotel" at Roanoke, Va., and he keeps both of them, by general consent, as hotels should be kept.

The Cincinnati, Ohio, Chamber of Commerce, though its able Superintendent, Col. S. D. Maxwell, sends us its 35th annual report, that for the commercial year ending August 31, 1883. This sumptuous volume of 357 pages, is a complete storehouse of information concerning the trade of Cincinnati, a city that is fairly entitled to the appellation of the commercial queen of the Ohio valley. We have marked a number of the tables and statements of this valuable volume for future comment. Cincinnati is, by all odds, the most important centre in the west for the productions of our coal mines and blast furnaces, so these states are deeply interested in all that pertains to the commercial prosperity of that city.

The Peabody Museum of American Archaeology and Ethnology.—Prof. F. W. Putman, the Curator, sends us the 16th and 17th annual reports of the trustees of the Peabody Museum of American Archaeology and Ethnology, of Cambridge, Mass. This volume well illustrates the excelent work that is now being done by Prof. Putman and those associated with him in conducting the affairs of this museum. The papers that accompany this report are exceedingly interesting. In these are gathered up a large amount of information concerning our Indian tribes, that otherwise would soon be entirely lost. Space is wanting to comment on these valuable papers. We have been especially interested in the one by Mr. Lucian Carr on the social and political position of woman among the Huron-Iroquois tribes. This proves, beyond question, that we have hitherto entirely misunderstood the status of the women of the American Indians. At some future time we will summarize this paper with reference to the Indian tribes of Virginia, and also call attention to other matters in this interesting volume.

Last year we had the pleasure of inspecting the archaeological and ethnological collections of this museum, under the guidance of Prof. Putman. We were so much impressed with it and the manner in which it is cared for that we are disposed to advise those having aboriginal relics, that they will part with, to send them to this museum. If we had any place in Virginia devoted to a similar object we would not so recommend, for we think that each state should have a collection of its own illustrating the life story of its aboriginal inhabitants. Why will not some liberal minded individual make a contribution to the University of Virginia for the purpose of establishing there a collection of this kind?

The Statutes of West Virginia on corporations.—We are indebted to Mr. Randolph Stalnaker, Jr., Secretary of State of West Virginia, for a copy of his compilation of "The Statutes of West Virginia relating to the formation of corporations and joint stock companies, in force June 1st, 1883," with an appendix containing a list of the officers of that state, the time of holding courts, etc., etc. This is a very valuable compilation, one furnishing information such as almost any one interested in the affairs of that state will need for frequent reference. One of its most valuable tables is that giving the official valuations of lands and personal property in West Virginia in 1871 and 1882.

The Coal Trade for 1884.—We are indebted to Mr. Frederick E. Saward, editor of "The Coal Trade Journal," for a copy of his annual for 1884 known as "The Coal Trade." This is the eleventh volume of this exceedingly valuable compendium of information relating to coal production, prices, transportation, etc., in the United States and elsewhere, during the year 1883. We find it one of the most valuable of our books of reference. Every one at all interested in the coal trade should have this volume at hand. It can be obtained by addressing the editor at No. 1, Broadway, New York.

The Geology and Mineral Resources of the James River Valley.—We are much obliged to Prof. J. L. Campbell, professor of Geology and Chemistry, in Washington and Lee University, Lexington, Va., for a copy of his work on the "Geology and Mineral Resources of the James River Valley," with a map and geological sections, published by G. P. Putman's Sons, N. Y. We published in *The Virginias* for 1882, from advance sheets and cuts, a large portion of this very valuable and interesting volume.

This work will be of great service to any one desiring reliable information concerning the geological and mineral resources of that portion of the James River valley lying above Richmond, a very important part of the state of Virginia.—The accompanying map topographically considered, is one of the worst of its kind. For this Prof. Campbell is not responsible, but he has managed to put upon it, in colors, a large amount of most valuable information in giving the location of iron ores, limestones, and other mineral belts. This book is published in very handsome style, and is a most important contribution to our knowledge of the geology and resources of Virginia. Its geological sections are especially to be commended.

Peerless is the name of a coal mine between Slaughter and Fields creeks, on the Chesapeake & Ohio Ry., Kanawha county, W.Va., that has just been leased by Messrs. Hale and Hallwood of Charleston. The coal from this mine, which was formerly known as the Houston, is said to be one of the best gas coals in the Great Kanawha field. It is rich in volatile matter and has a high candle-power, while the coke made from it is excelent. We hope this venture may prove a successful one as the lessees are both most estimable gentlemen. Hereafter we will give the analysis and gas-tests of this fine coal.

A beautiful medal, one of those struck for the R. E. Lee Camp No. 1, Confederate Volunteers, Richmond, Va., has been sent us by Messrs. Wm. H. Warner & Bro., manufacturers of medals, badges, etc, 1123 Chestnut street, Philadelphia, Pa. This medal is a highly creditable piece of workmanship; it is really an artistic ornament, one that the brave men for whom it was made may well be proud of.

Personals.

Dr. J. W. Mallet has returned to the University of Virginia and again taken the chair of analytical and applied chemistry that he had so long and so ably filled in that institution, having resigned the presidency of the University of Texas after holding it for one year. There is, as a matter of course, a general expression of gratification that Dr. Mallet has returned to Virginia and to his old place, The board of visitors could not find in the whole world a more worthy successor for him than himself.

Prof. I. C. White, of the Morgantown, W. Va. University, is now at Wheeling locating natural gas wells. We learn that he has been very successful hitherto in locating such wells, two, recently, at Washington, Pa. Prof. White has a theory of his own in reference to gas wells which, so far, in his professional practice has worked out successfully. We believe he is, as yet, the only geologist in the country that has made the location of gas wells a specialty. It is fortunate for West Virginia and the adjacent regions, where natural gas seems to abound, that such a specialist as Prof. White can be consulted.

Gem furnace, at Milnes, Va., on Shenandoah Valley RR. is now out of blast for relining. Its three new Whitwell stoves are completed and everything about the furnace is being put in thorough repair. It is expected it will be ready to go into blast early in July with a largely increased production. The president of the company that owns this furnace, Hon. Wm. Milnes, Jr., informs us that they are making better blooms now from pig iron made at that furnace, with coke for fuel, than they ever made from pig iron made with charcoal. This is a very important matter, one showing the great advantage Virginia has for the production of high grade pig iron with its superior New River and Flat-top cokes. This indicates that the Cripple Creek region will be able to make a better quality of car-wheel iron with coke than it has ever been able to produce with charcoal, consequently it can furnish a better iron than heretofore and for less money, since coke is so much cheaper than charcoal.

Geological section at Pocahontas.—Mr. W. A. Lathrop has kindly furnished *The Virginias* the following detailed geological section, made by him at Pocahontas, Tazewell county, Va., in the fall of 1883, of the State-line ridge, the one in which is the East mine of the S. W. Va. Improvement Co., (See map, page 34 of this volume) and below it. From the top of the ridge down to coal bed No. 5 the measurements were made with a barometer; from No. 5 down to the level of the N. & W. Ry. station at Pocahontas with a spirit level; and thence to the bottom by a bore-hole.

.....	Top of State-line ridge 2,747′ above tide.
40′...	Concealed.
2′ ..	*Coal bed No.* 7.
20′ ..	Concealed.
1′ 6″	*Coal bed No.* 6.
80′ ..	Concealed.
2′ 6″	*Coal* .... } *Coal bed No.* 5.
2′ ..	*Bone and dirt.* }
91′ ..	Concealed.
2′ ..	*Coal bed No.* 4.
90′ ..	Concealed.
6′ ..	Sandy fire-clay.
10′ ..	*Coal* } *Coal bed No.* 3.
0′ 3″	*Slate* }
1′ ..	*Coal* }
6′ ..	Fire-clay.
61′ ..	Shales and sandstones.
1′ ..	*Coal* } *Coal bed No.* 2.
2′ ..	*Shale* }
1′ ..	*Coal* }
12′ 6″	Concealed.
431′ 9′	Height of spur above Pocahontas station.
.....	Pocahontas, N. & W. Ry. station 2,315′ above tide.
15′ 4″	Gray sandstone.
1′ ...	*Coal bed No.* 1.
2′ ...	Slate.
27′ 6″	Sandstone.
3′ ...	Slate.
35′ 4″	Gray sandstone
8′ 8″	Sandstone with *streaks of coal.*
27′ 2″	Sandstone and shale.
4′ ...	Gray sandstone.
8′ 5″	Gray sandstone and shale.
8′ 10″	Fire-clay and shale.
7′ 10″	Blue slate.
15′ 1″	Sandstone and shale.
17′ ...	Gray sandstone.
27′ 1″	Dark slate.
26′ 3″	Blue sandstone.
26′ 4″	Blue sandstone, very hard.
1′ ...	Slate.
23′ 10″	Gray sandstone.
102′ 7″	Dark shale—lighter at bottom.
3′ ...	Gray sandstone.
2′ 4″	Gray shale.
1′ 6″	Gray sandstone.
2′ ...	Gray shale.
7′ 6″	Red shale.

The Coal and Iron Ry. has a party of engineers, in charge of B. S. Randolph, C.E., engaged in making surveys in the vicinity of Moorefield, Hardy, co., W. Va. Our readers will remember that we published in 1882 a geological map of northeastern Virginia and West Virginia, showing the proposed routes for this railway to connect the Potomac-Cheat coal-field and the W. Va. Central and Pittsburg Ry, with other railways leading to tidewater. Recent movements indicate that this scheme will probably now be carried out, either in connection with the extension of the Washington & Ohio to the Shenandoah Valley Ry., at Berryville, by way of Winchester, or by the Virginia Midland from Strasburg.—This road will develop a fine belt of country, one abounding in coal, timber, iron and other resources, that is now without a railway. Ex-Senator H. G. Davis is the prime mover in this matter and he generally succeeds in moving along what he undertakes.

Bee-keeping in Virginia.—Mr. James Craig, of Mount Meridian, Augusta county, Va., sends us some valuable information derived from his experience in bee-keeping. His apiary is composed of Italian, hybrid and black bees. He considers the Italian superior to the others in gentleness, prolificness and beauty. In honey producing he thinks the Italians superior to the blacks but not to the hybrids. The blacks produce whiter and prettier comb honey than either the Italians or the hybrids, but they cannot compete with them in the amount produced. The Italians rank first in gentleness, the blacks second, and the hybrids third. The hybrids gather more honey, and seem to be hardier than either of the other races, but they have the ill-nature of both races combined.

Mr. Craig has, at this time, twenty-five colonies, which will be increased to fifty this fall if this is a good bee season. He hopes to make from these colonies from 1,200 to 1,500 pounds of extracted honey. He produces but very little comb honey, only enough to supply special customers. He says "there seems to be such a prejudice against extracted honey in our market, I have almost concluded to produce only comb honey." He cannot see why there should be such a prejudice against the extracted honey as it is the genuine article just as it comes from the flowers, with what changes the bees have made in making it into honey; it has no foreign substance in it. The extracted honey now produced is a very different article from the old fashioned strained honey. The old way of melting, mashing and straining honey through a cloth or seive, produced an article composed of old comb, pollen (commonly called bee-bread), and sometimes the larvae of the young bees, that was not very desirable. Honey as now extracted is a very different thing in all respects, as there is no straining, melting or mashing done in producing it. It is thrown from the comb by a machine, made especially for the purpose, by centrifugal force, therefore the honey so extracted contains no foreign substance whatever; all that is left in the comb. After this honey is thrown from the comb it is strained from the extractor and put into tin tanks, where it settles and where any specks that it may contain rise to the top and are skimed off. As so obtained it is the purest of sweets. In cold weather or in a cool place this will crystalize, or candy, and become solid, somewhat like lard. This is one of the best proofs of its purity. Adulterated honey will not crystalize under any circumstances.

Mr. Craig thinks that for a great many family purposes extracted honey will in time take the place of sugar, as in the making of cake, puting up of fruit, &c.

Mr. Craig is also a keeper of poultry, and he finds that bee-keeping and poultry-keeping work very well together. At this time he is raising two breeds of fowls, the Plymouth Rocks and the Leghorns. He thinks these the best for eggs and for table poultry.

We hope Mr, Craig will furnish us with more information from his experience in keeping bees and poultry.

U. S. Geological Survey work in West Virginia.

The wisdom of the general government in lending its aid to the development of the wealth and natural resources of the country is nowhere, perhaps, better illustrated than in the work being carried on by the survey in that portion of the Alleghany coal-field that lies between the Great Kanawha and Chatarawha (or Big Sandy) rivers in West Virginia. Topographical work in this section has been in charge of Mr. W. A. Shumway. The necessity of preliminary topographical work needs no proof; for it is a self-evident proposition, that without the aid of correct maps, defining the mountains and ridges within which are embraced the main geological features of the country, the geologist, however well versed he may be, is likely to be led into error. The more complicated the geological structure, the greater the degree of accuracy required in the geographical work.

A glance at any of the existing maps of the United States will show that this southern part of West Virginia is about as destitute of railroad communication as any other district of the same area east of the Mississippi river, if not more so.

The peculiar topography of the Apalachians caused engineers to look suspiciously on attempts to cross its ridges at right angles to the axes of uplift, and for a long time retarded the development of this region. Thus unprovided with transportation facilities, the country itself was naturally but sparely populated, and of itself unable to construct the means of communication with the great tides of commerce passing to the north and south. Another factor retarding the development of the region has its origin in the vexatious litigations concerning titles and the ownership of West Virginia lands, which was due largely to the indefiniteness of former survey-lines, run independently and without connection with each other. This state of affairs will, in large part, be remedied by the work of the geological survey.

The completion of the Baltimore & Ohio, and the Chesapeake & Ohio railroads demonstrated the possibility of practical and feasible routes through the supposed barrier of the Alleghanies, and has partially developed one of the most valuable coal areas within the limits of the United States. It now remains to construct lateral branches, and to make a comprehensive and detailed investigation of what promises to be one of the most interesting mining and manufacturing regions of the country. Mr. Shumway, in 1883, surveyed between four thousand and five thousand square miles of this section, comprising the counties of Wayne, Boone, Logan, Wyoming, Mercer, Raleigh, Lincoln, and portions of Cabell, Fayette, Kanawha, and Summers. The office of the completed map is to supply the geodetic features for the establishment of the true position of the geological formations, and to serve as a basis for a subsequent elaborate and exhaustive geological study of the included region. Like all the older states settled previous to the adoption by the government of the present rectilinear surveys, West Virginia has been forced to rely, for her geological maping, upon such field-work as very meagre state appropriations allowed. The work accomplished was consequently of a very fugitive nature; and, because of the absence of any connected system of land-surveys over the state, the existing published maps have no claim to faithfulness in the delineation of the geographical features of the country, much less to accuracy in the portrayal of the surface configuration.

It is true that innumerable land-traverses cross and recross the country in a perfect network of lines, some being run with more or less respectful regard to nature, but the greater number being surveyed by engineers solely in the interests of the land-owners. In the few instances which have a plausible claim to accuracy, the variations of the magnetic meridian, differing by no inconsidarable amount in contiguous tracts of land, and resulting often from the presence of iron oxide beneath the surface, preclude the possibility of accepting these disjointed meanders as furnishing reliable and correct geographical data for use as a basis of scientific work.

The difficulties met with in maping the area under consideration are those common to the work in the southern Apalachian mountains, where dense forests, and the absence of a sufficient number of commanding points well situated for triangulation stations, offer obstacles to the topographer which make the most constant demand on his experience and judgment, and, at the same time, call for the most extravagant outlay from his stock of patience and good nature. It is doubtful if, within the limits of the United States, there exists another section of country in geological structure so simple, yet for topographical work so replete with obstacles and difficulties, as this coal region of West Virginia. It is simply bestowing credit where it rightly belongs, to state that the forthcoming map is mainly the result of the experience and able judgment, in geographical work, of Mr. Henry Gannett, the chief geographer of the survey, who supervised the work in this area.

The character of the topography here, as in all regions, is derived from, and varies with, the nature of the geologic formations. The most casual study of the stratigraphy of the district evidences the fact that the entire country, now underlain by the coal formation, at one time constituted a vast basin or geosynclinal. After a long period of oscillations, producing a series of emergences and submergences, during which the succession of coal beds and inter-stratified sands, clays, etc., were formed, at or near the close of paleozoic time, there occured an epoch of disturbances which resulted in the general elevation of the Apalachian region, and produced the numerous ridges, faults, and displacements of the Alleghanies. As might naturally be infered, the greater the distance from the centre of disturbance, the less prominent were the effects, until reaching the axial line of the Flat-top and White-oak mountains. We find that from here, westward to the Ohio river, the entire country seems to have been elevated in one mass, hinging on that river, and having a gradual slope to the northwest, which is the direction of the prevailing dip. The development of faults relieved in a large measure the strata lying to the westward; and the presence of the massive sandstones in the conglomerate series, also, no doubt, aided in preventing the flexures extending to the west.

This region may therefore be regarded as an eroded plateau, sloping from the east toward the Ohio; so that, to the west of the axial line just refered to, the rocks dip faster than the plane of erosion, and we pass necessarily into higher and higher strata of the coal-formation; that is, the highest strata in geological position occupy the lowest place geographically. The general plane of the country is determined by the upper surface of the conglomerate series, which continues to rise from the west, until, in the mountains already mentioned, it attains an elevation ranging between thirty-two hundred and thirty-five hundred feet. The Raleigh plateau-region owes its existence to the presence of the conglomerate series.

The comparatively incoherent strata of the carboniferous above the conglomerate sandstones were quickly eroded away. When the upper surface of the hard conglomerates was reached, the degradation of the surface in a measure ceased, and the mechanical action of the streams was concentrated in deepening and widening their channels. This has produced the cañon-like features so characteristic of the New River district.

The lateral wear in most cases was necessarily slight. The marshes of Coal river form, however, a singular exception to the general topographical features; as in this case the ero-

sion, acting laterally, has resulted in a deep and rather broad valley. The conglomerate series, with its slope to the northwest, passes beneath the lower coal measures near the embouchure of Gauley river, which, in turn, sink beneath the water level a short distance west of Charleston. The lower barrens, which overlie them still farther west, pass beneath the upper coal measures.

The cañon-like features of the valleys are gradually lost as we go westward from the Kanawha Falls ; and the hills become lower and lower, until when the Ohio is reached, they do not rise more than two hundred feet above the river.

With the exception of the gradual difference in elevation due to the general rise in the country from the Ohio westward, the surrounding knobs appear on one and the same level, and offer the most indisputable evidence of the plateau nature of the entire country ; the mountains being simply the uneroded remnants of higher strata, resting on the basal plane of the conglomerate series.

It is this character of the country, in which there are few salient points well located for suitable stations for instrumental work, that retards topographical work, and renders impracticable the application of methods that are elsewhere best adapted to effect the most economic and accurate results.

The primary triangulation extending over this section connects at the north and south with the triangulation work of the U. S. coast and geodetic survey,while the lines of the secondary work estalish geographical positions throughout the entire area included between the Kanawha and Chatarawha rivers. With these numerous geodetically determined positions, it was found possible, by judicious adjustment, to utilize a large amount of existing matnrial, sufficiently accurate in point of drainage detail, but heretofore valueless as a means of absolute location.

The completed map, as prepared for publication, will be upon a scale of 1:250,000, or approximately four miles to one inch, in approximate contour lines having a vertical interval of two hundred feet. When draughted, and made continuous with the government surveys extending throughout the the whole southern Apalachian region, it will serve as a basis for subsequent geologic investigation in the field.

The field of work included in these surveys has long since been recognized as a most important one ; and nowhere more than in the coal-measures of West Virginia is there a greater need for most concise and accurate geological and geographical knowledge, for nowhere can be found circumstances so favorable for the advantageous employment of capital.—"Science" for May 16, 1884.

Iron-making in the South.—Under this heading we find the following letter in "The Iron Age," of New York, for May 29 1884 Mr. Maury has been a manufacturer of iron in Virginia, as our readers know, and is a mining engineer of experience and repute. His sensible letter is well worth careful perusal and candid consideration by all those iuterested in iron manufacture in the South:

To the Editor of The Iron Age :—I have read with much interest Mr. Samuel Noble's article on this subject that appeared in the "Southern Industrial Review," of Atlanta, and other papers, in which he gives a long list of furnace failures in that section. While I do not question his facts, taken individually, yet I do the general impression that that letter leaves on the mind of a reader, viz., that to engage in making pig metal in the South always means loss, and that the Northern districts can make it cheaper than Virginia, Tennessee, Georgia and Alabama—those four states usually constituting "the South," as far as iron is concerned. All my remarks herein refer to coke iron. Mr. Noble mentions these failures in such a way as to lead to the belief that Alabama, &c., are exceptional in this respect; but if the history of any iron district in America is examined it will be found that its pioneer years are marked with as many wrecks as is Alabama (who built her first coke furnace only eight years ago), with perhaps the single exception of the Lake Superior charcoal furnace region. These failures are less due to the want of raw materials than to want of experience in the business, and I count the management of a 5 to 10 ton old-fashioned charcoal furnace, no matter how successful it may have been, as "inexperienced" when it comes to handle a 50 to 100 ton coke furnace. Old, experienced, thoroughly accomplished iron-masters, who can give the subject the benefit of their personal attention, usually have their capital fixed in some iron center of many years' growth, and are not the class who act as pioneer builders in new districts. When they do they are successful, as they go into the matter with their eyes open and knowing what they are about. This pioneer work is left to speculators, men who have surplus capital to invest, and enthusiasts, who are apt to spend money in many useless ways, who build and buy at a greater cost than they ought to, and, often failing to get a No. 1 superintendent, meet with accidents, chills, scaffolds,&c., as a consequence, and finally they don't know the niceties and intricacies of the market for the metal. As a consequence of one or more of these things, they have to gain success by pluck and more capital, or to acquire their experience through the cost of a failure ; then at the sheriff's sale those who have gained experience can secure the property at its actual and real value, and if there are elements of success in the business it is then that the fact will be made apparent. As I have said, this is the early history of every iron district in the states—all in their pioneer days were full of wrecks—and the fact that Alabama has them after only eight years in the business, by no means indicates that here is an exceptional case

The South has a great advantage in making iron in the propinquity of quantity of the raw materials. From Virginia, through Tennessee, and into Alabama, the coal and ores lie in parallel belts only 10 to 100 miles apart, with limestone close to the ore, while in the other parts of the United States it is no uncommon thing for the ores to be brought hundreds of miles and the fuel to be handicaped with long rail or river freights. This is shown in a very striking way in the last census, on page 168 of the part devoted to iron, prepared and compiled by Mr. Swank, secretary of the American Iron and Steel Association, where it is stated that all the iron ores in the United States stand an average haul of 400 miles from the mine to the furnace, and the fuel to smelt them is hauled an average of 200 miles. Now, as the ore and coal in the South are only 10 to 100 miles apart—far below the above average—it stands as a natural sequence that the distance for the rest of the country must be above this average, rendering the contrast all the more striking. If these figures be reduced to mileage for a single ton, when 2¼ tons of ore and 1¼ tons of fuel are required for a ton of metal, then 400 miles for the ore and 200 miles for the coal amount to a total of 1150 miles transportation for a single ton for the United States at large, while in the South, in those cases where it is necessary for only one of the materials needed to reach the other, a total mileage of from 30 to 225 miles is all that is required.

This question of propinquity was commented upon by Mr. Lowthian Bell, of England, probably the most widely known of any one ironmaster in that country and America, when he visited this country in 1874, at which time he was president of the British Iron and Steel Institute. During that visit he examined all of our chief iron centers, and in May, 1875, read a paper in London before his association upon what he had seen. In that address he says: "The distances which

intervene between the coal and ore, and which are more or less conspicuous in many of the iron districts of the United States, are so modified in many parts of Alabama, Georgia, Tennessee and Western Virginia as to place several localities in these provinces in a position of equality with the most favored of those I have examined in Europe. * * * * * With labor on anything like equal terms it is a physical impossibility that iron can be made more cheaply in the United States than it can in England. * * * * *So far, I am taking no account of the undeveloped resources of Tennessee, Georgia and Alabama, which will, as I have already indicated, prove a match for any part of the world in the production of cheap iron.*" Th· italics in this quotation are mine. In two conversations with Mr. Bell, in London, last February or March, on the subject of American iron, he reiterated this opinion, saying that the South was bound eventually to become our leading iron center as it was more and more opened up by railroads and as the manufactories of finished iron were located near the furnaces.

Whenever railroads have connected Southern coal and iron, development thereof has rapidly followed. Thus, in Virginia there was not a single coke furnace in 1873, in which year railroads joined the coal and iron fields; since then 11 furnaces have gone into blast. In Tennessee there was no coke furnace in 1867; now there are 8. In Alabama the first one blew in in 1876, and now there are 10. Here is the striking fact, that prior to 1867 there was not a single coke furnace in these three states, and now there are 29, representing many million dollars original investment, and it is a fair conclusion to draw that the last 10 or 15 would not have been erected if the previous ones were all dead failures. Even the class of pioneers I have described, no matter how enthusiastic they might have been, had some successes before their eyes as criterions before they ventured on the last stacks. And, again, on January 1, 1883, out of the 17 coke furnaces under construction in the United States, 10 were in this "wrecking" belt in Virginia, Tennessee and Alabama, leaving only 7 for the other 21 iron-producing states of the Union It must be borne in mind that iron declined all through 1882, and hence there must have been some good inducements for the south to have this preponderance in construction.

A difficulty that region does labor under is its distance from the pig-iron markets (the rolling mills of the country), not its distance from the markets for finished iron. In 1882 over 53,000,000 population consumed 4,963.278 tons of pig iron—within a small fraction of 210 pounds per head—at which ratio the states from Virginia to Texas, including Tennessee and Arkansas, with a population of 13,000,000, consumed 1,217,408 tons, of which amount their own furnaces produced only 339,766 tons—just a·out enough to furnish the nails and spikes for the 2,933 miles of new railroad that were built that year in those States, let alone the tonnage needed for bridges, rolling stock, keeping up the 18,-732 miles already in operation, and the thousand and one other wants of 13,000,000 people—all of which had to be drawn from other sources and pay freight to reach them. All the Southern pig metal, with the exception of a very small percentage, now pays freight to reach Northern rolling mills, and the finished iron stands another freight to come back, just as Georgia used to pay to send its raw cotton 1000 miles to New England and pay to get the calico, &c., back, instead of, as it now does, manufacturing on the spot and saving both freights The South can and will do the same thing in iron, but the furnaces must be the pioneers; the rolling mills will come afterward. Time will accomplish this, but before the paths are plain and smooth (if the ironmaster's path can ever be said to reach that delectable condition) the enthusiasts and men not trained and experienced in the business have got to pay for this learning and for the competitive fight against all and every one of those mills already in operation with large capital and a skilled labor population, and there will be wrecked mills as well as furnaces, except where practical men with first-class management take hold and know fully beforehand into what they are going. As for the plea that "a free-trade policy would enable Pennsylvania and Ohio to get cheap labor, cheap everything," and that, therefore, the furnaces in the North would do all of the business, it can be said that such a policy would also give "cheap labor, cheap everything" in just the same ratio to articles in the South, and that, therefore, the relative footing between the two sections would remain the same, the propinquity of the raw materials all being in favor of the latter.

M. F. MAURY.

Avondale, Cincinnati, May, 24, 1884.

The Geological class of West Virginia University, consisting of students W. T. W. Barb, R. C. Berkeley Jr., W. H. Michael, J.W. Sweeney and H. L. Robinson, in charge of Prof. I. C. White, has just had its customary month of field geology. Leaving Morgantown May 7th, the rocks were studied along the Baltimore & Ohio RR., where are some of the finest geological sections in the Union, from Fairmont to Harper's Ferry, taking in all the formations from the Archaean up to the Upper coal measures, inclusive. Returning to Piedmont the West Virginia Central & Pittsburg RR. was taken to its terminus at the Fairfax stone and examination made of the grand Potomac-Cheat coal basin. From Fairfax the party footed it across the mountains, 75 miles, to Buckhannon, thence down the narrow-gauge railway to Clarksburg, along the Baltimore & Ohio to Parkersburg, up the Little Kanawha to Burning Springs, then back and up the Ohio, by boat, to Wheeling, where the party disbanded on the 25th. We are promised some of Prof. White's always interesting and valuable "notes" of things geological seen and measured during this class excursion, for *The Virginias.*

We find the following in the "Wheeling Intelligencer".—Prof. White, of the Morgantown University, who, with his class in geology, recently made a tour of the Potomac valley and regions thereabouts, has written a letter to Col. T. B. Davis, of Piedmont, regarding the coal fields along the line of the W. Va., C. & P. road, in which he says: "We went down the line to the 8-foot vein, and also to the 11-foot bed. I found the coal much better than I expected, and was enabled to fix their positions geologically with reference to the coals in your hills at Piedmont, a result in which you will be interested, I am sure. You have certainly a big bonanza in this coal field, for the 8-foot bed is famous for its coking qualities, and the 11-foot coal is another of our most persistent and valuable seams."

Grape-culture ought to become a leading and important industry in all the Eastern Blue Ridge region of Virginia, the one in which the soils, derived from the decay of the epidotic rocks of the Archaean formation, are rich in potash and therefore especially adapted to the growth of a juicy grape, one abounding in saccharine matter and so good for wine making. To show that this is there a paying business it is only necessary to state that the owner of a vineyard near Afton station of the Chesapeake & Ohio Ry. has a standing offer of 5 cents a pound for all the Catawba grapes he can deliver, in bulk, at that station.

The Guyandot river, W. Va.—In the report of the Chief of Engineers of the U. S. Army for 1875, we find the following description of Guyandot river, W. Va., and the region it drains, by engineer Arthur L. Cox:

This river rises in the Cumberland range of mountains, and flowing in a northwesterly direction, through the counties of Wyoming, Logan, Lincoln and Cabell, empties into the Ohio river at the town of Guyandot, Cabell county, 164 miles above Cincinnati, Ohio. The survey extended from the mouth of the river to Logan Court House.

The valley of Guyandot river is caused by the erosion of the rocky strata peculiar to the true bituminous coal measures. It gradually becomes narrower, and the hills increase in height as we ascend the stream, the vertical height of the hills at Logan Court House being 1,200 feet above low-water mark of the river.

There are no table-lands in all the Guyandot valley, the various tributaries and branches of tributaries to the river having each to itself a similar valley of erosion. Thus, all the region of country drained by this river is cut into valleys divided by sharp ridges, and probably one-fourth of the surface of the valley above the level of the water-courses has been worn away.

From the mouth of Mud river to a point, say, 40 miles above Logan Court House the Guyandot river receives no tributary which contributes anything to the volume of the river except in a rainy season. This is a marked peculiarity of the physical features of the stream; and it thus results that in the dry season the volume of water at Logan Court House fully equals, if not exceeds, that within a few miles of the mouth. The scenery is, indeed, noble, and in full autumnal tints the long sweep of forest clad mountain presents to the traveler's eye an ever-varying picture of surpassing beauty.

From the mouth of the river to the falls the river-bed is a continuous declivity with a sandy bottom Above the falls we have alternate pools and shoals, the latter of small irregularly-shaped sandstone. The river bed varies in width from 250 to 350 feet, with alluvial banks 40 to 60 feet in height, to the level of the bottom-lands. The banks are of sand and clayey earth, and where striped of forest-trees and shrubs are easily destroyed—worn away by the action of the river-floods. They may safely be declared exceedingly unstable. In many places the bottom lands are filled with craw-fish that have "honeycombed" the territory from the river side to the base of the mountains.

The distance from Logan Court House to the mouth of the Guyandot river is 81.5 miles. The total fall of the river in this distance is 147.76 feet. I have taken great pains to ascertain the minimum volume of water discharged by this river. From September 20 to November 12 of this year there was but a slight rain-fall in this portion of the state. A cross-section of the river on the 16th of October, gave a flow of 110.8 cubic feet per second. Another computation, based upon observations of the river November 12, 1874, gave a flow of 30 cubic feet per second.

I think we may safely conclude that the discharge of this river will never fall below 20 cubic feet per second, while for the most part of the three dry months the river will yield a volume of 40 feet per second, and probably for nine months of the year the supply will reach from 120 to 170 feet per second.

The vertical rise of the river is very great. The best measurement obtained was at Rogers' mill. The weir is 300 feet in length, with 6 feet vertical height, and a shoal with several feet fall below; and the vertical rise—the depth of the flood of water, between 25 and 30 feet. This is the extreme flood of the river; but when the lands of the valley shall be measurably cleared of forest trees, we may reasonably predict that the changed condition of the water-shed will raise the high-water mark of the floods from 15 to 20 feet beyond the point which they at present reach. Nearly all the river banks are lined with forest-trees, great numbers of which lean out over the river, and should be carefully cut, so that in removing the obstructions no great damage would result to the banks to which they are a great protection. The principal obstruction to the present navigation of the river, are the remains, six in number, of an old system of locks and dams, which were constructed some 18 years ago. But one of these,—Rogers' mill, yet stands, and it is a very serious obstruction. The other locks and dams have been torn away by the action of the floods, until, with one exception, they are out of the way. Dam No. 2 of the old system near the mouth of Mud river, yet remains in part. It should be removed. The little mill dams along the river are generally built at the top of the steeper shoals, and are from one to three feet in height. They are provided with a navigable pass. A portion of the dam is movable, and this taken out, floods all the shoal, and really improves the navigation as at present used.

The present navigation of the river seems to float out into the Ohio river small rafts of timber on the floods, and also to carry up stream all the merchandize and manufactured articles used in the country bordering upon the river. A slow and somewhat tedious method of transportation is carried on by means of "push-boats," a kind of flat-boat of from 50 to 30 feet in length, and 7 feet in width. That portion of the river from the mouth to the falls, 30 miles, contains the chief chief obstacles to be overcome by these boats. At all times of low water, the volume of water is spread over the river bed into numerous channels that do not afford a sufficient depth for even this class of boats, unless they are very lightly laden. Above the falls the pools of water are from 3 to 20 feet deep, and present no difficult navigation to these boats. The shoals are improved by chutes constructed by the boatmen. They have removed the stones and dug passages a little exceeding the width of their boats, thus contracting the water-flow over the shoals.

The Guyandot River valley is but ill-adapted to farming purposes, and except fruits, I think will never furnish agricultural products which would to any great extent, seek a market over the proposed slack-water navigation. There is something done at present in the way of raising stock, and this industry would probably increase. Timber and logs are the only product of the valley exported to any great extent, and this is, as yet, in its infancy. James Weighbest, Esq., of Logan Court House, estimates the annual product at $300,000. Prof. James Bachman, of England, says of this valley, "As a botanist, I was astonished at the magnificence of the forest. There are valuable timber, trees not scattered singly, but covering all the country-side." Prof. John Locke says, "Although the formation, is, in general, sandstone, yet from the abundance of the decomposing shale the soil is rather clayey than sandy. The forests, although they contain a preponderance of oak, have a good share of trees such as sugar maple, hickory, black walnut, linden tree, magnolia, and tulip-poplar.

The valuable woods are oaks, *Quercus alba*, *Q. rubra*, *Q. tinctoria*, *Q. castanea*, poplar or tulip tree; the hickories, *Carya sulcata*, *C. alba*, *C. tomentosa*, chestnut, beech, elm, and maple. Of these, but the white oak, poplar and black walnut are sent away to market, but all varieties are being destroyed by clearing for farms.

The manufacture of wooden wares of all kinds would spring up all along an improved navigation, and thus turn to use much valuable timber now being yearly destroyed.

Thomas Thornburg, Esq., of Cabell Court House, for many years a merchant upon this river, estimates the yearly exports of all kinds from the valley at $400,000.

I have collected the number of tons which yearly go up the river from wharf boat and river men, and upon their estimates I place the figures at $300 000.

From Upper Two-mile creek to Logan Court House there are continuous veins of bituminous coal of good workable depth above water. The notable veins opened are: a vein of from 4 to 5 feet in thickness, in which there is some shale; a vein of 6 feet in thickness, which is very free from dirt; and a third vein, from 9 to 10 feet thick, with a vein of shale in the centre of a thickness varying from 1 to 2 feet.

Above Nine-mile creek are veins of cannel coal from 2 to 5 feet thick. I doubt if the cannel coal strata can be relied upon as continuous; they may interchange with the other varieties, or they may "pocket." Their extent, however, is considerable, one vein showing along the hillside on Big Ugly creek for 18 miles so often as to lead to the conviction that it is continuous for that distance.

Probably one-fourth of the coal veins are worn away by erosion of the valleys, as heretofore stated, and from the frontage along the river valley, for a distance of, say, seventy miles, much of the coal can be run down incline planes, and dumped directly into coal barges. There exists fairly creditable testimony that veins of coal exists below the water level. In 1866 an effort was made at Mill creek, half a mile above the falls, to obtain oil by means of boring; this disclosed the fact that coal existed in various strata of different sized veins to a depth exceeding 600 feet.

It is suggested, with the greatest diffidence, that there exists near or not far below the mouth of Four-mile creek a monoclinal axis, where the northwestern dip is largely increased; also, that at or near the mouth of Big Ugly creek there exists an anticlinal axis, which makes the strata horizontal, or gives a southeast dip as far as Logan Court House. This hypothesis will account for the appearance and disappearance of the large and upper vein of coal. A second well was bored for oil at Brown Trace creek, 23½ miles from the mouth of the river. Its depth is nearly 1,300 feet, but no record of the successive stratifications passed through can be found. At the above depth a vein of salt water was struck which discharged the full size of the tube with violence. It has been partly pluged, but still flows a quantity of salt water. It is stated that this well flows a saturated solution of chloride of sodium; a statement the accuracy of which I have no means of testing.

Nodular or "kidney" iron-ore is found scattered all over the valley, and occasionally in place, much of which would probably be mined and shiped out to the Ohio river, were this stream improved; but I think that large deposits will have to be found to justify the erection of blast furnaces depending upon the local supply. It would be quite in place that an ore of iron similar to the celebrated Scotch blackband should be found in this valley. The three months of the year which would afford a scant supply of water for the locks might readily be tided over by the construction of a reservoir, could a suitable location be found. This examination did not extend to cover this point.

The enormous quantity of coal in the hills fronting the river, and the ease with which it can be loaded in barges, the probable manufacture of woods and wooden ware, the production of salt, and carriage of iron ores, as well as the vast increase of merchandizing which would follow this improvement, all seem to indicate that the necessary outlay would be remunerative and the work entirely successful.

I think this improvement ought to contemplate the carriage of such coal and iron as can be used upon the Mississippi river below Cairo, at the present time. This would require, according to my information, barges of 150 feet in length, 25 feet beam, and 7½ feet draught. In order to conform to this rate, the depth of water upon the miter-sills of the proposed locks on the Guyandot river should be increased to 7¾ feet and the works strengthened accordingly.

Table of Elevations on Guyandot river, W. Va.—The following table of elevations on Guyandot river, above the ocean level and above the Ohio, are from the same report as the above article:

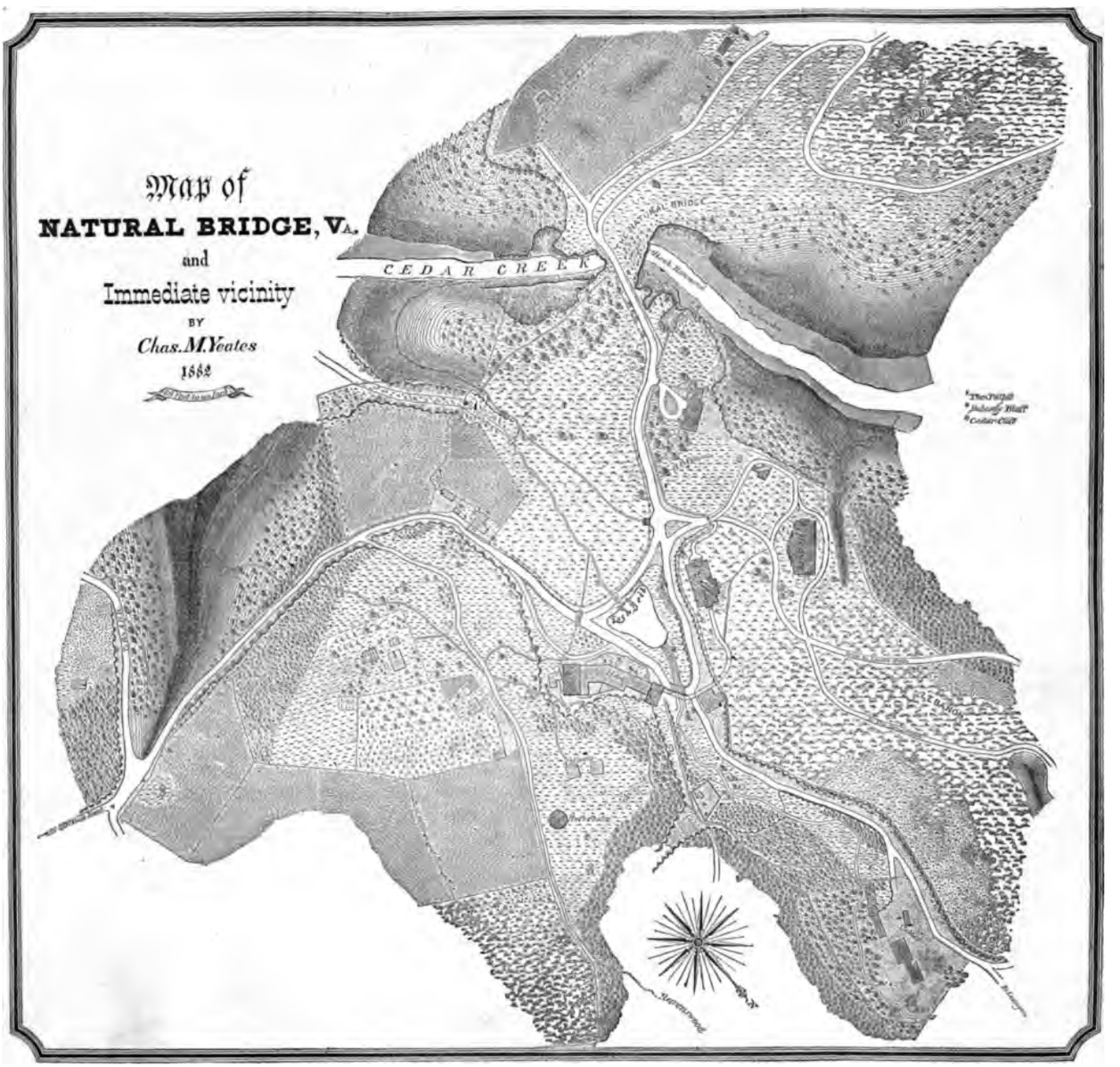
Place.	Miles from Ohio River.	Ft Above low-tide of ocean at foot of shoal.	Ft Above low water of Ohio River at foot of shoal.
Ohio river	0	497.034	0.00
Rogers' mill-dam	13	522.834	25.80
Salt-Rock dam	25¼	539.434	42.40
Falls in Guyandot	30¾	549.434	52.40
Four-mile shoal	34½	556.234	59.20
Laurel shoals	41¾	562.234	65.20
Hatfield's shoal	43½	567.434	70.40
Shoal	44¾	571.434	74.40
Hamilton shoals	47½	573.034	76.00
Little Ugly shoal	48¾	577.034	80.00
Shoal	50¾	580.634	83.60
Lambert's mill-dam	54½	584.234	87.20
Heart Creek shoal	57¼	588.634	91.60
Green shoals	60	593.434	96.40
Muskrat shoals	62	597.034	100.00
Big Creek shoal	64	599.434	102.40
Shoal	65¾	602.634	105.00
do	66¾	604.634	107.60
do	68¼	605.834	108.80
do	69½	608.234	111.20
Godby's lower shoal	70¼	610.034	113.00
Godby's upper shoal	70¾	615.234	118.20
Tony's shoal	72½	617.434	120.40
Peck's shoal	74	620.034	123.00
Peck's mill-dam	74½	626.634	129.60
Shoal	75¾	630.234	133.20
Buffalo shoals	77¼	632.634	135.60
Shoal	79	638.634	140.80
Logan shoal	80½	640.634	143.60
Logan Court House	81½	644.794	147.76

Ohio Central RR.—The River, or Great Kanawha, division of this railway, from Point Pleasant to Charleston, W. Va., is now in the hands of Mr. Thomas R Sharp, 115 Broadway, New York city, as receiver. Its chief engineer, Mr. J. A. Yates, is now gathering information concerning the coals, etc., of the Great Kanawha above Charleston, thus indicating an effort to extend this road up the Kanawha, probably, at this time, as far as the mouth of Gauley river, giving it access to the unsurpassed block, splint, gas and cannel coals of the Middle measures of that region—coals that will find a ready market, because of their character, in all the great coal consuming country north and west of the Ohio, even to Chicago, by the direct lines of this railway and its connections It is a well known and established fact that while there are vast coal fields beyond the Ohio their coals, as a rule, are not first class, as are those of the Great Kanawha and other basins in West Virginia, consequently there will always be a good market for West Virginia coals in that direction whenever proper railway connections are made and transportation facilities afforded. The Ohio Central is in the right line of direction for this trade.

Poor mountain iron ores.—We are indebted to Mr. Samuel A. Crozer, of Upland, Pa., for the following analyses of ores from the Poor Mountain or Chapman mines on N. & W. RR., Roanoke county, Va., made March 28, 1884, probably by Mr. Salom, chemist of Crozer furnace.

	No. 1.	No. 2	No. 3.
Insoluble residue	26.39	21.14	13.34
Metalic iron	43.22	45.30	51.84
Phosphorus	1.11	0.82	1.36
	70.72	67.26	66.54

No. 1 was from the upper or eastern cut; No. 2 from the middle, and No. 3 from the western or field cut.



The Map of the Natural Bridge of Virginia and its vicinity, above presented, is a reproduction, reduced 4½ times, of the large and beautifully executed map, from actual surveys, of a portion of the fine Natural Bridge estate, made by Chas. M. Yates in 1882. The scale of this map as here given is about 360 feet to an inch, instead of 80 feet, the scale of the original, as stated on the map. It is unfortunate that this map is lettered without reference to the meridian, although it may be said, in extenuation of this violation of the topographer's cherished rules, that it shows as now lettered the surface maped as it is first presented to the traveler approaching the Bridge from Lexington or from the railway stations. But this will not do, for if the topographer had this idea in mind he should have made what is now the left hand side of the map the bottom of it, and then it would present the features of the charming and highly cultured landscape embraced in this map as they are presented to the visitor approaching it from the station of the Shenandoah Valley or of the Richmond and Alleghany railway, and looking northwest and up Cedar creek, since that romantic stream flows due southeast after passing under the Natural Bridge.

This excellent topographical map will well repay a careful study. It reveals the charming combination of glens and mountains, grassy fields and leafy forests, well kept awns and tangled cedar hollows, broad and gentle highways and narrow rocky pathways, that with the ever-wonderful Natural Bridge make this spot of earth so continuously attractive.

One of the most interesting features of this map, in our opinion, is its unintentional revelation of the origin and structure of the Natural Bridge. That appears as a connecting remnant of a great horizontal bed of limestone rock that once entirely covered what is now the gorge of Cedar creek, that stream then flowing through a long subterranean cave or tunnel. All of the rocky roof of that tunnel except the Bridge has now fallen in and been worn and washed away during the lapse of "untold centuries." The sharply broken edges of the opposing rock masses remain, as the map shows, to attest this former continuity and to reveal the origin of this grand and ever interesting specimen of Nature's bridge building.

The Real Want of the South.—It is a matter of constant regret that we have not space to spare in *The Virginias* to reproduce the numerous admirable industrial and other articles of current interest that in this era of active development are constantly appearing in the columns of our cotemporaries, but we cannot refrain from republishing the following every way sensible editorial from the "Weekly Visitor," of Lynchburg, Va., a most excelent family paper, edited by Mrs. Thomas Whitehead. With womanly intuition and a motherly appreciation of what our "boys" are, and of what they ought to be—and of what, we beg leave to say, a goodly number of them have become—our fair editor discloses our greatest and most vital present want:

"We learn from the 'Industrial South' of last week, that the South needs men rather than money; or rather that more men as well as more money, are necessary for the improvement of the country and the development of its resources. We read with great pleasure this ably edited journal, and derive much useful information from its columns. We would therefore not wish to appear as disagreeing in any disagreeable way, with what is so well and clearly stated. We would offer an amendment, or rather a suggestion of an amendment; that it is not more more men, but men with different ideas, that the South needs; and not a great influx of men unless they are men of the right kind. What is needed, we think, is men of different training, different every day education, with the same principles as ourselves; or that our young men with correct principles learn to act upon them. We have no room for men who will prey upon the country, or whose evil influence will destroy it. Producers, not consumers, is what we need to revive the impoverished, slowly rallying southern land. Before we invite others to till our lands and manage our different interests, we must see that we have utilized what forces we have, and that the men born in the state are doing the best in their power to help themselves. Before we call for workers, we must ascertain, if possible, if we are really in need of workers; or if, from any cause, the men of the South are failing to do their duty in helping their land and country, and bringing it to a higher level financially as well as politically.

A great change has come upon the South—a change very evident to all who can remember the past, and the pleasant *ante bellum* days. It has come to pass that many women not used to labor with their hands have been forced by dire necessity to do so. We hear continually of the duty to "put the shoulder to wheel." Some have done this literally, others only figuratively. There are still many men who talk of work, who have not yet handled any implement of actual labor for a useful purpose. Their idea seems to be to make just enough money to live upon, and to do so with as little effort as possible. Food, clothing, and secure situation where the hands will not be roughed or the complexion injured, seem to be all that some desire or expect to obtain.

Seeing how poor women are pressed out of the way, and lose all chance to get work when opposed by strong and healthy young men, we could almost smile at the comedy of struggle, if the tragedy of starvation or something worse did not follow so closely after. We are convinced that it is not more men we need, to make the country prosperous, but that the men we have already should take a broader range in life, learn to work like men, above all, to think like men. We believe it is only necessary that each man be put into the place he can fill best to insure abundant prosperity to our country, and that every hand of man or woman do with its might what it finds to do.

Immigration is desirable, if immigrants are of a substantial honest class of people. Indiscriminate immigration would be a curse to our country. We ought to be sure that their principles—religious, social, and political, are good before we encourage any set of men to "come in and possess the land." It will be too late when, in possession, they run the ship of state upon the reef, to regret that we, with haste to be rich, brought in a laboring class to ruin us. Far better let the hills of Old Virginia lie bare and brown in the sweet sunshine, or be covered with the wild broomsedge only, and her valleys be covered with white field daisies, rather than with the roar of machinery and the voices of busy workers there comes also the clamor of those who "strike for bread" while they pour the yellow gold into the coffer of the capitalist.

We think, perhaps enviously, of the prosperous North; of how, in the years of the past, we helped to make it what it is. We see only the glitter of the gold in the hand of the wealthy, heeding not, if we hear, the wail of despair, the starvation, and crime beneath it all.

It is not so much men and money the South needs, as a willingness on the part of all, to labor with the hands if it be necessary; and that the strong, by seeking easy, light work, block not the way of the feeble who stretch out their hands, asking for a place in which to labor, or for work to do, and ask it in vain. Hundreds of women all over the South would gladly assist in supporting their families if they could only find something to do. We think the need of the South is some influence which will put men in men's places, leaving a a vacancy in light work for women whose necessities require it. With all who love the South we earnestly desire that her resources, agricultural and mineral, be fully developed, that the burden of debt be taken from the states and from every man within our borders. But we had rather be poor all our days than change the old State as she will be changed by the bringing in of men and women with the "isms" of the outside world. These will come, if we invite without restriction as to what class of men and women shall accept the wide invitation. It was a sad day for all when Virginia's daughters saw before them the necessity of leaving the shelter of home, and father's or husband's protection, to seek a place in the working world. That they shrank from it, who can doubt. Increased comfort to loved ones, independence for themselves, has proved to many, ample compensation. There are still numbers of willing hands waiting. There are, dependent upon girls, fathers, poor and old, who see, with a feeling almost of scorn, the young stalwart men monopolizing the light work which the feeble hands might do, while they are forced to stand idle; although the South cries for "Men! men! more men." Yes, it is "more men" the South needs, more manly, hard-handed men, men with enterprise, activity and energy. Men to strike out, not following or hanging around others who are building up fortunes for themselves. It is our conviction that if every man filled the place for which nature fited him, and women were allowed a little niche wherein to labor there would be no need for the South to ask the outside world for either men or money."

The Virginia Manganese Co., as we see by one of our exchanges, has recently declared a dividend of 10 per cent, as it well can, since it is the owner of the noted Crimora manganese mine, on the Shenandoah Valley RR., Augusta county, Va., from which there is a steady output of high grade manganese ore from which this company realizes, we are informed, a royalty of $2 per ton.

The Baltimore & Ohio Telegraph Co. is bravely and boldly pushing its lines in all directions, though everywhere opposed by the Western Union. Its has lately forced its way into and through New York city, and is now constructing lines to the New England cities. It will soon have its cable line to Europe open. Its advent in this city has been of very great advantage.

Coal consumption in Philadelphia, Pa—Philadelphia, says "Bradstreet's," consumes annually about 2,300,000 tons of anthracite and 900,000 tons of bituminous coal; an aggregate of 3,200,000 tons. The retail price of anthracite is put at about $6.50 and of bituminous at $4.65 per long ton. The papers of that city are now complaining that its people have to pay from 75 cts to $1 per ton more for coal than cities do that are further from the mines; that they are discriminated against by the railways to the great disadvantage of their manufacturing interests. One of its gas companies has recently imported 2,930 tons of coal from New Castle, Eng., which cost, after paying freight and the 75 cts duty, $4.13 per ton, when Pa. gas coal cost $4.65. One of its rolling mills that makes sheet iron, using 4 tons of soft coal in making a ton of sheet iron, claims that it is discriminated against 75 cts on each ton of coal used.—These items suggest that Philadelphia might be a good market to reach, by water, from some of our Virginia tidewater coaling stations; they also show the vast consuming power of a large manufacturing city, Philadelphia alone requiring yearly more coal than the entire output of several important coal fields.

The U. S. Coast and Geodetic Survey is one of the institutions of our country of which every intelligent citizen can always conscientiously speak well. Its work, though continental in extent and most difficult in character, has always been thoroughly,accurately and economically done, so that some specific and useful result can always be shown for every dollar it has expended. Its skillful, earnest, industrious and gentlemanly assistants have been at work in nearly every portion of the Virginias in the past twenty years and our people have naught but commendation for them and for their work to offer.—We are led to these remarks that we may protest against the proposed turning over of this survey to the Navy department,as contemplated in a bill now pending in Congress. We hope the good sense of our National legislature will in this case "let well enough alone." As now organized this survey can call to its service the best talent of the country, as it always has done, and can retain that talent in its service mainly in consequence of its independent organization. Again we protest, most earnestly, and for the general welfare, against any change in the conduct of this survey. Let it continue to occupy the field it has so nobly won.

Virginia goods appreciated.—The "Chronicle" says: The Charlottesville Woolen Mills have been awarded a contract to supply the United States army 15,000 yards of 6-4 military cloth, (which is equivalent to 30,000 yards of 3-4 goods), and as much more as the army may need, of this quality, and have been invited to bid on 110,000 yards of a coarser cloth, with a probability of being awarded the same. Our mill neighbors are not only entirely satisfied with the price, but are particularly pleased that their goods, which were shown to the army officers, were complimented in the highest terms.

These mills also turn out all grades of cassimers, fine and common, and, by competent judges, their finer qualities are considered as good as the imported and they are much cheaper.

The wheat crop of Virginia for this year will be one of the largest and best ever harvested in the state. Harvesting fairly began in Tidewater the second week in this month, in Midland and Piedmont the third, and in The Valley the fourth; in Apalachia it will be well under way the first week in July. Wheat from Tidewater Virginia appeared in the Baltimore market in the third week of this month.

The next or July number of "The Virginias" will contain a topographical map of the new Cripple creek branch of the Norfolk & Western RR., in Pulaski and Wythe counties, Va., from actual surveys, showing (in colors) the location of furnaces, mines, etc., with a full description of that region and its resources. It will also contain much information of permanent value in reference to the Norfolk & Western and the Shenandoah Valley railways and the country near those important roads. To this number we invite the attention of advertisers and others interested.

The Chicago, Parkersburg & Norfolk Ry. Co. has appointed Col. J. B. Yates its chief engineer. This company was organized for the purpose of constructing a railway from Clifton Forge, on the line of the Ches. & Ohio Ry., the present terminus of the Richmond and Alleghany, by the most practicable route it can find, through the counties of Alleghany and Pocahontas, to the head of the Little Kanawha river, in Webster county, thence by way of Braxton Court-house to the Little Kanawha, and down that river to Parkersburg. From Parkersburg westward, this road will be extended via Zanesville and Marion, Ohio. From Marion to Chicago the connection will be with the Chicago and Atlantic Ry. The distance from Clifton Forge to Marion will be about 462, and from Marion to Chicago about 269 miles. At Clifton Forge connection is made with the Ches. & Ohio and the Richmond & Alleghany Rys., both leading to tidewater. This road will pass through a country in Virginia and West Virginia that has not yet been traversed by a railway. It will open a very direct line from Chicago to Hampton Roads. Col. Yates is now making a thorough examination of the proposed route, and the parties connected with this scheme are confident that this railway will be constructed in the near future.

The June rain laws of Virginia are stated as follows in the Farmers' bulletins of the U. S. Weather service:—For the Middle Atlantic states, during the month of June, winds blowing from the southwest to southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast to northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

The Grafton & Greenbrier RR., a portion of which is now in operation, as a narrow gauge road, from Grafton, on the B. & O. to Philippi,W.Va., will probably soon be extended up Tygart Valley river, at least as far as Beverley, and perhaps to Huttonsville; as it is stated, on good authority, that the Baltimore & Ohio will contribute liberally towards this extension. We are glad to see railways reaching towards the water-knot in Pocahontas county. An inspection of the map will show that from this point, southeast of the end of Cheat mountain, the waters flow in nearly all directions; consequently this is destined to become an important railway centre or crossing point. Engineers are now engaged in making surveys for the southward extension to the same point of the West Virginia Central & Pittsburg Ry., the cars of which are now runing to Fairfax Stone. Towards this same point, as elsewhere stated, the Ohio Central is looking for the extension of its road up Gauley river.

Each of these roads will derive great advantage from their meeting at this common point of divergence, since each of them will pass through a country rich in mineral, forestal, and other resources, in going to that point; and then when they have once met there they will be in the line and direction for a large amount of travel and traffic between the two great railways, the Baltimore & Ohio and the Chesapeake & Ohio, that run nearly parallel with this great undeveloped region between them.

The Rorer Iron Co. was re-organized June 25. 1884, at Roanoke, Va., under a charter granted by the Legislature of Virginia, March 7, 1884. The officers elected for the first year are: Ferdinand Rorer, of Roanoke, Va., president, George M. Bartholomew and Samuel Coit, of Hartford, Conn., and E. G. McClanahan, of Roanoke, and Jed. Hotchkiss, of Staunton, Va., with the president, as directors: J.H. Sykes, of Roanoke, Va., secretary and treasurer; and J H. Bramwell, of Roanoke, Va., superintendent of mines and railway and sales agent. Henry Body is in charge of mining and shiping operations.

This company owns about 3,000 acres of land in fee and mineral fee, lying south of Roanoke, Roanoke county, Va., the larger portion of which is underlaid by a thick bed of high grade limonite iron ore. This company owns and operates a well built narrow-gauge railway, fully equiped, some 5½ miles long, that connects its mines with the Shenandoah Valley and the Norfolk & Western railways. At its terminus on these railways in West Roanoke, it owns 27 acres of land, fronting 2,800 ft. on the above railways; on this it has ore pockets and other arrangements for the convenient storage and shipment of ores. At its Gale mine, where mining operations are now conducted, it has some 15 buildings, and ore is being mined from a face or breast of solid ore 75 feet long by 50 high, presenting one of the finest displays of stratified iron ore in the country. This mine is connected with the company's office in Roanoke by its own telephone line 6 miles long.

In the present condition of the Gale mine 400 tons of ore can be easily mined daily. If there were a demand for the ore this company could readily open mines on its property to supply daily many times this quantity. It now has on hand, in its stock-yards, 3,000 tons of lump and 4,000 tons of washed ore.

By its charter—page 448 of Acts of Assembly for 1883-4, this company is granted very liberal powers; among others, authority to construct and operate a railway from Roanoke, Va., through the counties of Roanoke, Franklin, and Patrick, or Floyd and Carroll, to some point on the N. C. line in Carroll or Patrick counties; power to own, hold, and dispose of 250,000 acres of land in the counties its railways may traverse, etc.

With its line of railway and its iron ore mines now in operation, this company has a good basis from which to extend its railway, as provided in its charter, to a connection with the Danville & New River RR., which has the same gauge, and so give that railway a connection with the Shenandoah Valley and the Norfolk & Western railways at Roanoke, a connection that would place the Flat-top coal and coke in reach of the Danville & New River road and its connections.

The tin veins of Rockbridge and Amherst counties, Va., are still being explored and the prospecting operations reveal good showings of cassiterite. It is probable that some English people, owners of tin mines in Cornwall, Eng., will before long visit the Virginia tin mines with a view of becoming interested in their development.

Danville & New River RR.—It is expected that this road will be opened to Patrick C. H. some time next month. Surveys are now being made from Patrick C. H. westward across the Blue Ridge to the Norfolk & Western, and southward into N. C., in reference to extensions.

Peanuts are being cultivated in Virginia this year, says the "Index-Appeal" of Petersburg, more than heretofore, as they have been a paying crop for several years past, bringing $1.75 a bushel. The crop of 1883 in the U. S. was 2,010,000 bush., of which Virginia furnished 1,250,000, Tenn. 600,000, and N. C. 150,000.

Geological survey along New and Great Kanawha rivers, W.Va.—It is very gratifying to be able to announce that Prof. I. C. White, of W. Va. University, has entered (at present for vacation work) the service of the U. S. Geological Survey and that he will immediately begin a geologic survey of the Great Kanawha coal basin (including in this term the New river basin also), working out in detail a complete section of the coal measures and other rocks exposed along New and Kanawha rivers from Hinton to the Ohio. This will furnish information of incalculable value to all the owners of coal lands along the 150 miles of river line embraced in this section.—Director Powell commends himself and the U. S. Geological Survey to the people of West Virginia by commiting this work to Prof. White and by puting him at once in the field. We now know that this important geologic work will be speedily and thorougly well done and that its results will soon be in hand to aid in the development of one of the richest coal fields in the world.

Crozer Furnace, at Roanoke, Va., that has been out of blast a short time for repairs, went into blast again very successfully, on the 17th of April. Its first blast was for 256 days, during which time it made 20,181 tons of pig iron; a daily average of nearly 79 tons.. With everything in good order and a large stock of raw materials and a considerable one of experience, it is confidently expected that this large and every way thoroughly well appointed furnace will now have an average output of 100 tons. Its pig iron has already established an excelent reputation in northern markets, especially Philadelphia; it is probably one of the irons that called forth the following item in the "American Manufacturer," Pittsburg, Pa., of April 18, 1884:

"*Southern Iron in Philadelphia.*"—A Philadelphia telegram dated the 11th says that considerable excitement prevails there in iron circles owing to the influx of southern made pig iron, which is being offered in lots largely off the regular quotations for Pennsylvania made iron of the same grade. A steamer from Savannah, Ga., arrived on the 11th with 100 tons, which was manufactured in Alabama, and which sold at $15 per ton. Considerable iron from the Shenandoah Valley of Virginia, is also, it is stated, being sold at Philadelphia at rates considerably below the regular quotations."

The Grass Products of Virginia in 1879, as reported in the census of 1880, are given below by the grand divisions of the state:

	Hay-crop of 1879.		Seeds, bushels.	
	Acres mown.	Hay, tons.	Clover.	Grass,
Tidewater..	17,668	15,930	124	292
Midland ...	36,817	34,061	275	1,807
Piedmont ..	71,772	64,454	2,782	12,274
Blue Ridge,	27,925	22,325	1,071	2,466
The Valley,	139,779	121,836	12,802	17,205
Apalachia,.	41,127	27,476	812	7,545
Trans-Apalachia	1,201	741	.....	79
Virginia...	336,289	286,823	17,806	41,662

The Rockbridge Baths Sanitarium, Rockbridge county, Va., of which Dr. Samuel B. Morrison is proprietor, now has its railway station at Gibson, on the Valley Branch of the Balt. & Ohio RR., 4½ miles from the Baths. Round trip tickets are now sold from most of the Eastern cities to the Baths, by this station, including stage fare. The "big" springs at this sanitarium rank among the most agreeable and invigorating of the "thermals" of Virginia and its well-kept hotel is in the midst of a charming and well cultivated country with romantic mountain scenery near at hand.

Mica, in large quanties, is now greatly in demand, if we may judge by the inquiries for it that reach us. We will be glad to publish the location of any mica deposits in Virginia, and will be obliged to any one that will send us such precise information.

The Virginias.

Serial No. 55. Vol. V.—No. 7.

Staunton, Va., July, 1884.

Jed. Hotchkiss, Editor.

Analyses of Catawba Iron ores.—Dr. Henry Froehling, analytical chemist of Richmond, Va., under date of July 3, 1884, furnishes *The Virginias* the following interesting analyses of samples of iron ore from Catawba or North mountain, Botetourt county, Va.—The numbers are those of Dr. F's list. All the samples were dried at 212° F.

	No. 214.	No. 215.	No. 216.	No. 217.
Silica	15.960	4.054	7.260	26.160
Ferric oxide	80.700	92.401	74.249	58.104
Ferrous oxide	....	2.172	....	....
Alumina	1.472	.645	6.157	5.237
Manganese sesquioxide,	....	....	....	.524
Lime	.170	.220	.110	.260
Magnesia	.036	.054	.014	.072
Phosphoric acid	.078	.033	.403	.359
Sulphuric acid	.007	.014	.028	.013
Water	1.517	.394	11.605	9.291
Totals	99.940	99.987	99.826	100.020
Metalic iron	56.490	66.375	51.970	40.672
Phosphorus	.034	.014	.176	.156
Manganese	none	none	none	.393

No. 214. Ore from "Beard's", on Catawba creek, from Middle ridge, between North and Catawba mountains.

No. 215. From Capt. Jas. Peak's, on Catawba creek; from same ridge as No. 214 but 6 miles distant.

No. 216. From Capt. W.W. Beard's, on Catawba creek, from continuation of Catawba furnace ore beds in North or Catawba mountain.

No. 217. From David Barnett's land on side of Catawba mountain.

These ores are in the vicinity of one route that has been proposed for a southwestward extension of the Richmond & Alleghany RR. or of the Valley RR. of the Baltimore & Ohio.—The analyses show that they are all exceptionally rich ores, ones well adapted for nearly all purposes and demands.

Bee-culture.—The catalogue of the admirable Miller Manual Labor School of Albemarle county, Va., for 1884, says: For several years we have had a few swarms of bees, but it is only during the past session that we have had time to build a suitable house for storing materials and working purposes, and also to clean off a place for an apiary. We have now a nice southern slope with large shade trees scattered over it. These are too tall and not dense enough to obstruct the bees when coming in, and still make it cool in summer and afford shelter in winter.

Our country abounds in blooms and flowers which would afford pasturage for a large number of colonies. We have now 20 strong colonies which will probably yield us 800 pounds of honey this season. The purpose is to build up an apiary of 100 colonies

Few things afford more pleasure and profit than the study of bees. They furnish a wonderful field for research and investigation. To the young no study is more interesting. We have all of the standard books on the subject, and five or six boys assist the teacher in charge in all of the manipulations. Of course this is the only way for them to become practical bee-keepers.

The Coal and Coke traffic of Ches. & Ohio Ry. for May, 1883 and May, 1884, are shown in the following table compiled for *The Virginias*, from official returns, by J. W. Hopkins the fuel agent of this railway.

Kind.	1884.	1883.	Increase.	Decrease.
Cannel	1,930	1,741	189	.....
Gas	27,607	35,867	.....	8,260
Splint and block	3,808	8,229	....	4,421
New River, &c	28,240	37,684	.....	9,444
Coke	4,357	7,763	.....	3,406
Totals	65,942	91,284	189	25,531

The distribution of the above was as follows:

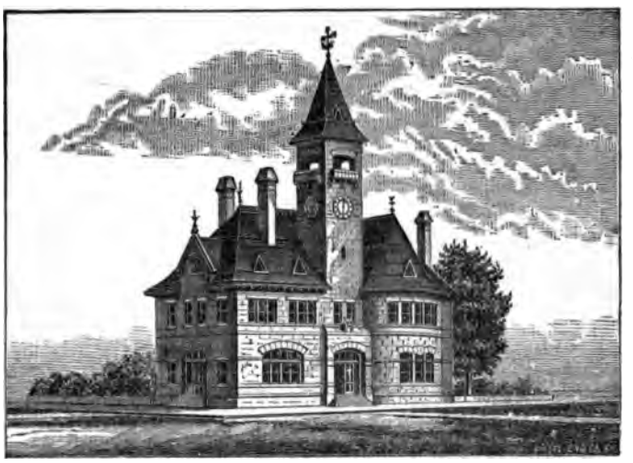
		1884.	1883.
1.	To Ches. & Ohio Co. for its own use	18,822	17,044
2.	To Huntington, for West via. Ohio river	....	3,354
3.	On Elizabethtown, Lex. & Big Sandy RR	2,069	1,139
4.	On Ches. & Ohio RR., excepting Richmond	12,765	12,834
5.	To Rich. & Alleghany RR. at Clifton Forge	124	786
6.	To Valley RR. of Baltimore & Ohio at Staunton,	....	.....
7.	To Shenandoah Valley RR. at Waynesboro	31	20
8.	To Va. Midland at Charlottesville	4,779	2,566
9.	To Rich. Fred. & Potomac RR., at Junction	....	1,240
10.	To Richm'd for consumption, includ'g tugs, &c,	7,524	12,697
11.	To James River wharves for shipment	5,280	12,754
12	To Newport News, For consumption, &c	763	733
	To Newport News, For shipment	13,785	26,117
	Totals	65,942	91,284

The movement from January 1st, 1884, to May 31st, 1884, inclusive, and for same time in 1883, was as follows:

	1884.	1883.	Increase.	Decrease.
Cannel	5,398	10,548	.....	5,150
Gas	135,355	155,370	.....	20,015
Splint and Block	29,715	45,715	.....	16,000
New River, &c	189,590	180,972	8,618	.....
Coke	23,006	48,373	.....	25,367
Totals	383,059	440,973	8,618	66,532

The Anthracite coal mines.—The Braithwaite anthracite coal mine is to be developed at any early day. This mine is near Cross Junction, in the northwest portion of our county. We called attention to the accidental discovery some three months ago while boring an artesian well. On last Friday there was recorded in our county clerk's office a contract made between Wm. F. and O. D. Braithwaite, on the one part, and William E. Zinn, Mr. Myers and Mr. Frick, an old and experienced miner, on the other part. Said contract recites that the mine will be developed in the near future, and that for and in consideration of the permission granted the above named parties of the second part to develop said mine, they are to pay to the parties of the first part the sum of six cents per bushel for all coal carried away by wagons, and nine cents per bushel by rail, should a railroad be built near by. They are also to pay to the parties of the first part 18 cents per ton for all iron ore mined and sold. The developers will soon begin work, and as the capital, machinery and brains necessary for the successful operation of this mine are all to be found in this firm, we hope to be able to announce hereafter that their venture has been an eminently successful one for all parties to the contract.—*Winchester Times.*

The Southern Exposition at Louisville, Ky., for this year, will be open from August 16 to October 25, giving 61 exhibition days and 10 Sundays. Improvements have been made in the grounds and buildings and liberal transportation arrangements made with the railways, so it is expected that the exhibition of 1884 will surpass that of 1883.



The new Court house and Post-office at Charleston, W. Va., shown in the above cut, was occupied as a post-office for the first time July 11th, 1884 In our May, 1881, issue attention was called to the fact that an appropriation had been made for this building and plans adopted. The original design called for a structure made with the beautiful gray, coal measures sandstones found near Charleston; we believe the basement was built of this and the superstructure of brick.

The "State Tribune," from which we learn of the completion and occupancy of this building, says of it: "This structure with its well proportioned tower faces toward Kanawha river, and opens out its shortest and nearest hall to the post-office rooms along a 200-foot graveled walk. On the inside the eye falls upon a large semi-circular vestibule well lighted and ventilated." The U. S. Court. and its officers, and other officials have rooms in the upper stories.

Charleston, the fair and finely located capital city of West Virginia is, by the steady progress of improvement in its streets, public and private buildings, business, etc., etc., becoming a desirable and attractive place both for residence and employment. The United States building is now completed and occupied; it will not be long before we can chronicle the completion and occupation there of the substantial and imposing state Capitol of West Virginia; it has ample and well kept hotels: its citizens are full of enterprise; it is reached by two great railways, and the noble navigable Kanawha flows past; it is fairly the queen of a grand river basin full of unrivaled resources. What is there to hinder its progress in growth and prosperity?

The place of the Pittsburg coal bed in the Great Kanawha basin, in reference to the other well known horizons of the coal measures, has hitherto been unknown, but we learn from Prof. I. C. White, as one of the results of his first week's labor for the U. S. Geol. Survey in that basin, that begining at Two-mile creek of the Great Kanawha, 7 miles below Charleston, he has been able to make a complete section and measurement of formation No. XIV of the Virginia survey, "the barrens" of the Pa. coal measures, and to determine that it is 750′ from the bottom of the "Pittsburg" coal bed down to the coal bed just below the "Black flint ledge." This is a good begining, one that at once furnishes valuable data not before in hand or known.

Reference to Prof. White's articles in *The Virginias* on the W. Va. coal measures, will show that he makes the Upper coal measures, No. XV, about 550 feet thick. In May, 1883, we published a compiled section of the coal measures of the Great Kanawha basin. From the better data in hand we may now summarize the approximate thickness of each formation of these measures as follows:

Formation No. XV, the Upper coal measures	550 feet
Formation No. XIV, the Barren coal measures (so called)	750 "
Formation No. XIII, the Middle coal measures	1,080 "
Formation No. XII, the Lower coal measures	1,100 "
Measured thickness of coal measures	3,480 "

Development of W. Va. counties on Ches. & Ohio Ry.—It is well known that railways exert a powerful influence in developing the resources of any region they may traverse that previous to their construction has been destitute of the means of cheap and speedy transportation. In illustration of this we have compiled, from the U. S. census reports and from W. Va. reports, the following statistics of the counties of Greenbrier, Monroe, Summers, Raleigh, Fayette, Kanawha, Putnam and Cabell, W. Va., the counties that are immediately on the line of the Chesapeake & Ohio Railway in that state, from the east westward, for the years 1870 and 1880, the first year representing the facts of condition and production before the opening of that railway, and the second those after that railway had been in operation across the state for some 8 years.

	1870.	1880.
Population	69,433	112,075
Native	68,047	109,995
Foreign	1,386	2,111
Assessed value of real and pers'al prop'ty,	$18.991,517	$19,793,538
Farm products		
Buckwheat, bushels	.....	21,696
Wheat, "	252,469	441,234
Rye, "	28,460	54,723
Indian corn, "	1,835,531	2,036,903
Oats, "	387,359	368,603
Irish potatoes, "	132,787	151,349
Sweet " "	.....	22,112
Tobacco, pounds	1,337,975	931,129
Wool, "	132,539	245,554
Butter, "	707,105	1,347,605
Cheese, "	3,990	8,881
Hay, tons	.....	26,732
Value of orchard products	.....	$113,886
Milk sold, gallons	.....	24,717
Value of all farm products	.....	$2,883,828
Live stock, number of		
Horses	12,158	18,487
Mules and asses	485	1,453
Working oxen	4,063	3,084
Milch cows	15,817	23,996
Other cattle	.....	41,147
Sheep	59,763	77,332
Swine	49,079	95,930
Value of all live stock	$2,276,089	$2,579,074
Acres of improved land	379,607	574,529
Value of farms	$15,072,953	$17,794,595

The following statistics are from official reports of the state of West Virginia.

	1871.	1882.
Acres of land	3,179,222	3,010,059
Value of land and buildings	$14,799,274	$14,934,991
Value of land, and buildings, per acre	$4.66	$5.23
Valuation of town lots and buildings	$1,632,470	$3,339,192
Valuation of personal property	$4,959,631	$5,224,087

Pocahontas, Va —Under the headings, "Model Coal works in Virginia," "The Southwest Virginia Improvement Co. at Pocahontas, Va.," the "Keystone Courier," of Connellsville, Pa., in its issue of July 11, says:

This company, whose vice-president and superintendent is H. C. Wickham, formerly superintendent of the Connellsville Gas Coal and Coke Co.'s works at Wheeler, and later superintendent of the Trotter works, certainly intends that its employes shall be favored with all the educational and religious advantages possible. Clarence H. Clark, Esq., of Philadelphia, has presented to the town of Pocahontas a very tasty rustic structure, costing about $1,600, which contains a reading room, called "The Clark Library," coupled with a public school room. Mr. Clark has generously furnished both rooms in a handsome manner and stocked the reading room with 300 volumes of assorted literary books. The Southwest Virginia Improvement Co. will add to the attractiveness of the reading room by furnishing leading Philadelphia and New York dailies and various illustrated and weekly publications. This company has erected at its own cost a $1,000 school house for colored children. This building was finished last fall, and school was conducted during the winter. The colored people use the building for Sunday and evening services,

The town of Pocahontas is composed of about 90 buildings, the company owning 50 of them, or 100 tenements. The company has built a large office and store building, costing $8,000. The town is incorporated, has a neat union church building, and with recent improvements, is now presenting a very cheerful appearance. The town is located about 160 miles west of Lynchburg. The east mine where the recent terrible explosion occured, is being sprinkled with water, in order to keep the dust down, and extensive water works are being erected for the purpose of permanently overcoming this element of danger in mining. A number of Connellsville men are employed in and about the mines.

Virginia for homes or business.—In the Southbridge, Mass., Journal, of July 4, 1884, we find the following good advice in a letter, by its editor, from Virginia:

We would advise all those who are looking for homes or places to invest in business to look through Virginia before locating, for the following reasons: On account of the elevation of the state the climate is healthy; the variety of soil, is adapted to nearly all crops, from the low sandy soil of the peninsula, or the Valley of Va., the garden of the state, to the fine grazing plateau on the Alleghany mountains; the extensive mines and mountains covered with a heavy growth of wood and timber suitable for every kind of building material, wheels, shuttles, wooden ware or paper pulp, and the cheap and durable water power for manufacturing purposes; the proximity to market; and the best of railroads for freighting. The water is good, and by the number of old buildings we should judge that cyclones had been unknown for the last 200 years, although in some localities one might do useful work.

The Suffolk Lumber Co's mill, Whaleyville, Va., recently burned, is to be replaced by a new one with 100,000 ft. daily capacity. The Stearns Mfg. Co. of Erie, Pa., furnishes the entire outfit.—The lumber business of this state is now in a prosperous condition, if we may judge from reports of work now being done.

Acts of General Assembly of Virginia, Session of 1883-4, relating to Railway, Mining and other companies.

The Acts of the General Assembly of Virginia for the session of 1883 4 have been published in a volume of 821 pages; from that we have prepared the following list of the Acts relating to railway, mining, and other companies, stating the page on which each is printed. A similar summary of the Acts of the preceding General Assembly, that of 1881-2, was published in *The Virginias* for June, 1881.

1. Acts relating to Railway Companies.

1. The Norfolk & Cincinnati RR. Co.: prescribing how it shall pay its mortgage bonds, and allowing it to consolidate with other railway companies whose lines propose reaching the iron ore deposits of eastern Tenn. and western N. C.—p. 9.

2. Massanutton & North Mountain Ry. Co: granting permission to construct a railway from some point in Warren or Shenandoah county, by or near New Market, to the W. Va. line, with the privilege of extending its road to Alexandria or to some point on the Potomac in or above Prince William county.—p. 21.

3. Lynchburg, Halifax & North Carolina RR. Co.; grants permission to construct a railway from Lynchburg to Halifax C. H. and South Boston and to the N.C. line near the bridge across Hyco river.—p. 25. Another act gives it permission to receive subscriptions from any connecting railway company, any mining or manufacturing company or any county interested in its construction.—p, 474.

4. Fauquier & Rappahannock RR. Co.; gives authority to the county of Rappahannock or any adjoining county interested in the construction of this road or its branches to make subscriptions to it.—p. 52.

5. James River & North Carolina RR. Co.; is authorized to construct a railway from some point on the Richmond & Alleghany RR., between Lynchburg and Lexington, to the town of Liberty, and thence through Bedford, Franklin, Henry and Patrick counties to the N. C. line.-p 75.

6. Norfolk & Western RR. Co.; is authorized to make contracts for the use of connecting lines, and to purchase stock in other companies that are not parallel and competing with it.—p. 113.

7. Richmond & Chesapeake RR. Co.: is authorized to construct a railway from the city of Richmond to Chesapeake bay near the mouth of Potomac river, passing through Henrico, Hanover, King William, King and Queen, Essex, Richmond, Westmoreland and Northumberland counties.—p. 114.

8. New York, Philadelphia & Norfolk RR. Co.: has the time extended for its completion from the Maryland line to a point near Cherrystone inlet, Northampton county.-p 115.

9. Virginia & West Virginia RR. Co.: is authorized to construct a railway from any point on the Virginia line in Frederick county to Alexandria or to any point on the Potomac below Limestone run in Loudoun county, and to construct a branch from the city of Winchester to any point on the Manassas Gap RR. between Strasburg and Salem-Fauquier.—p. 142.

10. Salem & Southwestern RR. Co.: is authorized to construct a road from Salem, Roanoke county, up the South fork of the Roanoke river and on through The Valley counties to the Tenn. line, at or near the South fork of Holston river; or through Floyd, Carroll and Grayson counties to the Tenn. and N. C. line.—p. 175.

11. Buckingham RR. Co.: the charter of this company is amended, requiring it to commence work on its road

within 12 months from the first day of January, and to complete it in six years.—p. 215.

12. Farmville & Staunton River RR. Co.: is authorized to construct a road from Farmville through Prince Edward county to some point on Staunton river below Brookneal; thence through Halifax and Pittsylvania counties.—p. 221.

13. Edenton & Norfolk RR. Co.: has its name changed to the Carolina & Chesapeake RR. Co., with authority to construct a road from the N. C. line, in Nansemond county, to the city of Portsmouth or Norfolk, or to any point on the Elizabeth or Nansemond rivers.—p. 230.

14. Virginia Midland Ry.: is authorized to issue bonds to provide for the payment of its present bonds and debts.—p. 246; another act authorizes the renewal of leases of other roads.—p. 372.

15. Washington, Ohio & Western RR. Co.: permission granted the city of Winchester to subscribe to its bonds.—p. 265; another act authorizes it to lease or consolidate with other railway companies in Virginia or with Virginia and West Virginia companies.—p. 439; another act authorizes Frederick county to subscribe to the stock of this company. —p. 439.

16. Petersburg Street Ry. Co.: is incorporated and authorized to purchase the street railways of Petersburg.—p. 269.

17. Farmville & Powhatan RR. Co.: is authorized to construct a railway from Farmville, Va., to Moseley crossing, on Richmond & Danville RR, Powhatan county.—p. 290.

18. Norfolk Land Construction & Improvement Co.: has authority to unite the waters of various creeks in the counties of Norfolk and Princess Anne with the Elizabeth river, by canal, and to construct railway tracks along the canals, to hold real estate etc.—p. 293.

19. Pittsburg & Virginia RR. Co.: is authorized to build a railway from Lynchburg, or any point on the Richmond & Alleghany Ry. west of Lynchburg, to any point on the West Virginia line in the counties of Highland or Bath.—p. 302.

20. Virginia & Western RR. Co: has authority to construct a railway from the Richmond & Alleghany RR. above Balcony falls by way of Catawba and Craig creeks to the West Virginia state line, except that it may not occupy the valley of New river below the town of Hinton. etc.—p 310.

21. Virginia & Kentucky RR. Co.: has authority to construct a railway from some point on the Norfolk & Western RR. between Dublin, Pulaski county, and Marion, Smyth county, Va., to some point on the Kentucky or West Virginia state line west of New river.—p. 321.

22. Danville & New River RR. Co: is authorized to obtain convicts for the extension of its railway beyond Patrick C. H.—p. 406; by another act it may issue prefered stock to the counties along its line that may subscribe to its capital stock.—p. 419.

23. Lynchburg & Southwestern RR. Co.: has authority to construct a railway of either standard or narrow-gauge from Lynchburg through the counties of Campbell, Bedford, Franklin, Floyd, Carroll and Grayson, to any point on the N. C. or Tenn, line, or to connect or unite with any other line in this state not parallel or competing with it.—p. 414.

24. Virginia & Carolina RR. Co.: may construct its road by the city of Petersburg and that city may unite with it in its construction.—p. 420.

25. Richmond & Louisville RR. Co.: is granted authority to transfer part of its franchises to the Iron Belt RR. Co. —p. 425.

26. Atlantic Improvement Co.: is authorized to construct wharves, piers, etc, near the city of Norfolk or Portsmouth, and connect them with railways.—p. 427.

27. Valley & Southwestern RR. Co: is authorized to construct a railway from the town of Lexington through the counties of Rockbridge, Botetourt, Craig, Giles, Bland, Tazewell, Washington, Smyth, Russell, Scott and Lee to a point on the Tenn. and N. C. line.—p. 428.

28. Richmond & Alleghany RR. Co.: is authorized to issue prefered stock to exchange for its second mortgage bonds and for the payment of its floating debt.—p. 431.

29. Fredericksburg & Chesapeake RR. Co.: is authorized to construct a railway from Fredericksburg through Stafford, King George, Westmoreland, Richmond and Northumberland, to some point on the Potomac, or on Chesapeake bay.—p. 436.

30. Sulphur Mines Co.: has authority to construct railways, not exceeding 40 miles in length, in the counties of Louisa, Spotsylvania and Orange, to connect its mines, works or lands with any other railway.—p. 450.

31. Virginia Mining, Milling & Transportation Co.: has authority to purchase or lease any railway, not exceeding 40 miles in length, in the counties of Spotsylvania, Campbell, Appomattox, Goochland, Louisa and adjoining counties.—p. 450.

32. Manchester Ry. & Improvement Co.: has its charter amended confering additional privileges.—p. 467.

33. South Atlantic & Ohio RR. Co.: is required to commence the construction of its road at Goodson, Va., by the first of December, 1885, and to complete it to Big Stone gap within two years.—p. 478.

34. Lynchburg, Halifax & North Carolina RR. Co.: charter amended so it may receive subscriptions from the counties of Halifax and Campbell or from any other counties, or from mining and manufacturing companies in Va. interested in its construction.—p. 478.

35. West Virginia & Ohio Mineral Ry. Co.: has authority to construct a railroad from some point on the Chesapeake & Ohio Ry. or the Richmond & Alleghany RR. to some point on the W. Va. line in Alleghany county, except that it may not occupy Wolf Creek nor Clear Fork valleys, in Giles and Bland counties, nor Rocky Gap in Bland county.—p. 480.

36. The Suffolk Lumber Co.: is authorized to construct a railroad of any gauge, from some point on waters of Hampton roads, by way of Suffolk to the N. C. line in Nansemond county.—p 555.

37. New River & Chambers Valley RR. Co.: has authority to construct a railway from some point on Norfolk & Western, between New River Bridge and Wytheville or from the Cripple Creek extension of N. & W. RR., through Carroll county, to Mount Airy, in N. C.—p. 481.

38. Iron Belt RR. Co.: is authorized to construct a railway from some point on James river, at or above Buchanan, to the W.Va. line at some point above Narrows of New river in Giles county; but it shall not occupy the valley of New River below the town of Hinton.—p. 506.

39. Dismal Swamp Canal Co.: has authority to construct a railway on its own lands from Gilmerton locks, Va., to South Mills, N. C.—p. 517.

40 Meherrin Valley RR.: is authorized to construct a railroad from some point on the N. C. line in Greensville county, through Greensville, Brunswick and Mecklenburg counties to Clarksville; and a branch from the main line of the road through Southampton county to Branchville.—p. 529.

41. Roanoke Mineral & Lumber Co.: is granted permission to construct railways, not to exceed ten miles in length, in the counties of Roanoke, Franklin, Patrick, Floyd and Carroll.—p. 645,

42. Richmond City RR. Co.: has authority to construct street railways in the counties of Henrico and Chesterfield, and over all bridges between the cities of Richmond and Manchester.—p 657.

43 Petersburg & Chesterfield RR. Co.: has authority to construct a railroad from Petersburg to Exeter mills, Chesterfield county,and to connect with railroads entering Petersburg.—p. 658.

44. Junction & Breakwater, Breakwater & Frankford & Worcester RR. Cos.: are consolidated and name changed to Delaware, Maryland & Virginia RR. Co.—p. 672.

45 Virginia Mineral Ry. Co.: is authorized to construct a railway from some point west of New River Bridge, on Norfolk & Western RR., through the counties of Pulaski, Wythe, Carroll, Floyd, Grayson, Smyth or Washington to the N. C. or Tenn. line.—p 678.

46. Norfolk Suburban RR. & Turnpike Co.: has authority to construct a railway or turnpike from Atlantic City, Norfolk county, to any point on Elizabeth river or Tanner creek, near Lambert Point; not to exceed five miles in length.—p. 685.

47. Atlantic & Danville Narrow-Gauge RR. Co.: is authorized to build at its terminus on James river, wharves, docks, warehouses, elevators, and cotton presses:—p 712.

48. Bowling Green RR. & Lumber Co.: has authority to construct a railroad from the Norfolk & Western RR. near Windsor station, Isle of Wight county, to some point on Cypress creek near Shirer's landing, with branches not to exceed 15 miles each in length.—p. 742.

49. Tazewell county Improvement Co.: has authority to mine, manufacture, etc., and to construct railways or water lines not over 20 miles long.—p. 519.

50. The tax bill requires that all railroad and canal companies not exempt from taxation by charter shall pay taxes on their road beds, tracks, depots, fixtures, machine shops, real estate, rolling stock, telegraph lines, miscellaneous property, etc., at the rate of 30 cents on each $100 of assessed value, for the support of the government; a further tax of 10 cents on each $100 of assessed value for the support of the public free schools, and an income tax of one per cent per annum.—p. 561.

51. Railroad crossings, where practicable, are to pass at surface grade, or above or beneath existing structures in such a way as to admit of speedy and safe travel across the track.—p. 528.

52. The Sunday railroad trains act prohibits the loading, unloading or runing of any trains on Sunday, between sunrise and sunset, unless it be trains for the relief of wrecked trains, for the transportation of the U. S. mail, passengers and their baggage, live stock, or of perishable articles. It imposes a fine of not less than $50 or more than $100 for each offence. Trains in transitu having started prior to midnight Saturday night, may run to reach shops or a terminus until 9 o'clock the following morning.—p. 743.

53. An act to lessen the danger of traveling requires all railways to establish at depots, not more than 10 miles apart, telegraph offices with competent operators to telegraph the arrival and departure of trains to the train master of the next station; also to erect fences on both sides of their road beds through enclosed farms or lots, and keep such fences in repair and to keep all crossings in order. They are made liable for all stock killed until their fences are pnt up. This act does not apply to lines within the corporate limits of cities and towns. This act makes it a misdemeanor for any person to walk on a track within 100 yards of an approaching train, except at a public crossing, or for any one to ride drive or lead any animal upon a railroad track, or to arrange for any animal to be on such a track except in crossing from one slde to the other, or to injure railway fences. It makes it a felony for any one to place or contrive to have placed any animal upon the track of a railway by the injury of which he might recover damages.—p. 702.

54. Lynchburg Street Ry. Co. has its acts under a judicial charter made valid, etc —p. 160 and 501.

55. Condemnation of lands: providing time to be arranged with the owner of lands condemned for the purpose of internal improvement.—p. 87.

55. An act transfers to the sinking fund all the state's interest in the Richmond, Fredericksburg & Potomac RR.—p. 148.

56. An act provides for condemnation of land for internal improvements by 5 free-holders appointed by court.—p. 87.

57. The Rorer Iron Co., incorparated with all the powers of a mining and manufacturing company, also as a railway company with authority to construct a railroad from Roanoke, Va., through Roanoke, Franklin, Patrick, Floyd or Carroll counties to the N. C. line.—p. 448.

The Tutelo Indians.—In the Proceedings of the American Philosophical Society of Philadelphia, Vol. XXI, 1883, we find a paper on the Tutelo tribe of Indians and its language,by Horatio Hale. These Indians lived partly in Virginia when Jamestown was founded, in 1607,so anything pertaining to them is here a matter of historic interest.—The last full-blooded man of this tribe, according to Mr.Hale, died in Canada as recently as 1870. Below we reproduce his photograph from Mr. Hale's paper.

Mr. Hale claims, as the result of his researches concerning this tribe and its language, that it belonged to the great Dakota stock with which under the names of Osages, Omahas, Sioux, Assinboins, etc., tribes dwelling in the vast prairie regions of the northwest, beyond the Mississippi, we are so familiar. He believes that the language of the Tuteloes leads to the conclusion that that tribe was the parent stock of the great Dakota race, and that it may have long ago migrated westward from the Atlantic slopes of Virginia and North Carolina, leaving behind it, in its old home, the remnant found there when Englishmen first came to Virginia.

These particulars concerning the Tuteloes are given: In 1671 an exploring party under Capt. Batt, leaving "the Apomatock Town," on James river, went westward, by the route traveled, 250 miles "to the Tolera town in a very rich swamp between a breach (branch) and the main river of the Roanoke, circled about by mountains." This "Tolera" is evidently Totara, says Mr. Hale; Totaro we should say. On its way to Totaro this party passed the "Sapong" (Sappony) Indian town, which Capt. Batt says was about 150 miles west of Apomatock town, and about 100 miles east of the "Toleras." (Batt's "Journal and Relation of a New Discovery," in N. Y. Hist. Coll. Vol. III.)

At this time (1671) the Five Nations, the Iroquois of New York, had, in their career of conquest, overcome the Hurons, the Eries, the Andastes (Conestogas) and the Delawares, and extended their rule from the Laurentian highlands of Canada to and beyond the Blue Ridge, in Virginia, where they came in collision with the tribes of Virginia and North Carolina. In 1686, the French missionaries record a projected expedition of the Senecas, one of the Five Nations, against the "Tolere," the same Toteros or Tutelos. The traditions of the latter record long and destructive wars with the Five Nations, especially the two western ones, the Cayugas and the Senecas, who, as we well know in Virginia, followed down the valley of the Susquehanna, until they came to the great Apalachian valley, near

Nikonha, — the last Tutelo Indian.

Harrisburg, Pa., then followed that valley across the Potomac and up the Shenandoah to Rockfish gap of the Blue Ridge, where the Chesapeake & Ohio Ry. now crosses that mountain, and then took the "Carolina trial" to the country of the Tutelos. To escape these raids of the Iroquois the Tutelos moved farther south and east and in 1701 John Lawson, the surveyor general of South Carolina, when at "Sapona" town on the west branch of Cape Fear (it should be the Great Pedee) river, heard of the Toteros as "a neighboring nation," in the "western mountains." He states "that at that time these Toteros, Saponas, and the Keyawees, three small nations, were going to live together, by which they thought they should strengthen themselves and become formidable to their enemies. They were then at war with the powerful and dreaded Senecas, whom Lawson calls "Sinnagars." Some of these Tutelos came to Sapona town while Lawson was there; he describes them as "tall, likely men, having great plenty of buffaloes, elks and bears, with every sort of deer amongst them, which strong food makes large, robust bodies." Farther on, in his History of N.C., he says: "These five nations of the Toteros, Saponas, Keiauwees, Aconechos and Schoicories are lately come amongst us, and may contain in all about 750 men, women, and children."

The Tutelos and Saponas (Sapponies) understood each others' speech, and it is probable that all the tribes mentioned by Lawson belonged to the same stock; they had, it is likely, all fled together from Virginia and gone south beyond the Tuscaroras, who then had 15 towns on the Neuse and Tar rivers, and so placed that powerful tribe, that then had 1200 warriors, between themselves and the dreaded Iroquois. But even then they were not safe; for Lawson was shown at Sapona the graves of 7 Indians, who had lately been killed by the "Sinnagars or Jennitos" (Senecas or Oneidas.)

Mr. Hale thinks the "great plenty" of buffaloes mentioned by Lawson gives a reason why this Dakota tribe lived east of the Alleghanies, as the Dakotas are especially a buffalo hunting race. He also states that the Big Sandy river was anciently known as the "Totteroy," (falling into an error,we are sure, for its Indian name has, so far as we know, always been writen "Chatterawha" or "Chatteroi"), and that it was so named from the Toteros, or Tutelos, who may, as the original Dakotas, have found their way westward from the head-waters of the Roanoke by those of the Big Sandy to Ohio, as there is evidence that tribes of the Dakota stock at one time dwelt or had hunting grounds in the valley of the Ohio, and that they followed the buffaloes in their northwestward migrations,

In 1711 a war broke out between the Tuscaroras and the white settlers in Carolina; the next year the Indians were defeated in an engagagement, when most of them retreated northward and joined the Iroquois, who received them as the 6th nation of their league, which thus became the "Six Nations" of early English-American history. A few of these Indians remained,merely retreating northward into Virginia, where they were allowed to remain in the Piedmont and Midland regions between the Roanoke and the Potomac, and where they were soon joined by the Tutelos and Saponas and their confederates.

In Sept., 1722, the governors of Virginia, Pennsylvania, and New York had a conference at Albany with the chiefs of the Six Nations, to induce them to make peace with the southern Indians and stop their warlike excursions against them which were always alarming to the frontier colonists. Governor Spotswood then enumerated,as the tribes for which Virginia would become surety, the "Christanna Indians" —from the fort of that name which had been established among them when they dwelt south of the James—"the Saponies, Ochineeches, Stenkenoaks, Meipontskys, and Toteroes," tribes which the Iroquois included in one name as Todrichrones. The Iroqouis yielded to negotiations for peace, though very reluctant to give up the privilege of going to fight the Catawbas, a powerful Indian nation that dwelt in central North Carolina.

Soon after this peace the remaining Tutelos, Saponas and Tuscaroras followed the previous Tuscarora migration northward and put themselves under the protection of the Six Nations, who received and established them on the Susquehanna, at Shamokin, now Sunbury, in central Pennsylvania, in the territory that the Iroquois had previously conquered from the Delawares and Shawanese, where were now congregated the remnants of the Conoy, Nanticoke, Delaware, Tutelo and other tribes, as vassals and subjects of the great Indian confederacy. Brainard, the Indian missionary, visited Shamokin, in 1745 and speaks of it in his diary as containing upwards of 50 houses and nearly 300 persons who belonged to "3 different tribes,speaking 3 different languages, and that about one-half of them were Delawares and the others Senecas and Tutelas."

In 1748 the Moravian missionaries record going through Skogari, an Indian town, in what is now Columbia county, Pa., much further south than Shamokin, which they describe as "the only town on the continent inhabited by Tuteloes, a degenerate remnant of thieves and drunkards," showing that all the Tuteloes were not located at Shamokin.

At a great council of the Six Nations, held at Oneida, N.Y., in 1753, these Tuteloes and confederates, under the name of

Tedarighroones, were received as one of the confederate nations. In 1763 Sir William Johnson mentions the four small tribes of "Nanticokes, Conoys, Tutecoes (evidently Tuteloes) and Saponeys" as settled on the Susquehanna, on lands allotted them by the Six Nations. After this, in 1771, these tribes appear settled near the Cayugas, near the present city of Ithica, N. Y. In 1779 their town was destroyed by Sullivan, in his expedition against the Iroquois, who had sided with the British in the Revolution. This destroyed, in a great measure, the Iroquois confederacy, whole tribes of which fled with Brant to Canada, where the British government assigned them lands, mostly along Grand river.

The Tutelos were among these refugees; they built a new town on the western bank of Grand river, on what is now called Tutelo Heights, a suburb of Brantford. There they lived and held their councils and celebrated their festivals; but proximity to the whites soon wrought their ruin. In 1832 and again in 1848 the cholera swept most of them away and all that were left deserted their homes,and joined the Cayugas, and thus the Tutelo tribe ceased to have a separate existence. In 1870, but one full-blood Tutelo remained, an old man named Nikonha, who died the next year at the age of 107.

From this old man,whose photograph he obtained, Mr.Hale gathered a vocabulary of Tutelo words and the traditions of the history of his tribe, in which his father had been a chief. He said the Tuteloes and Saponies understood each others' speech, and that the Saponies parted from them when his tribe crossed the Niagara to Canada.

Mr. Hale concludes, from what he has learned, that the Tuteloes had a lively and mirthful disposition, unlike the grave and composed Iroquois; a disposition that survived in full force in old Nikonha, the last of his race.

These Tuteloes called themselves Yesang, or Yesah, from which probably came the name Nahyssan, which John Lederer, a German traveler, who, at the instance of the colonial government of Virginia, visited them in May, 1670, gave them. Starting from the falls of the James, he relates in his "book of Discoveries," that after 20 days travel he came to Sapon,a village of Nahyssans," on a branch of Roanoke river, and that 50 miles beyond Sapon he arrived at Akenatzy, an island in the same river, which, though small, maintains many inhabitants, who are fixed in great security, being naturally fortified with fastnesses of mountains and water on every side. These "Akenatzies" were probably the "Aconechos" of Lawson and the "Ochineeches" of Gov. Spotswood.

Beverly, in his History of Virginia, mentions "Occaneeches," who, though a small tribe, spoke a language that was the general language of communication, (like French or Latin among the Europeans), among tribes who did not understand each others' language, and that this "Occaneeche" was the language used by the "priests and conjurors" of the different Virginia tribes, as Latin is used by the Catholic priests. Mr. Hale argues from this use of its language that the Akenatzies or Occaneeches were the leading tribe among those of the Dakotan stock found in Virginia, and that these tribes once had a large and wide spread population which was gradually displaced by incursions of Algonkin and Iroquois stocks from the far north, as the traditions of those stocks indicate.

Mr. Hale remarks: "That the Tutelo tongue represents this general language of which Beverly speaks—this aboriginal Latin of Virginia—cannot be doubted. It may, therefore be deemed a language of no small historial importance. The fact that this language,which was first obscurely heard of in Virginia two hundred years ago, has been brought to light in our day on a far-off Reservation in Canada, and there learned from the lips of the latest surviving member of this ancient community, must certainly be considered one of the most singular occurences in the history of science."

Describing our illustration, Mr. Hale says: "The portrait of old Nikonha, an accurate photograph, will serve to show better than any description could do, the characteristics of race which distinguished his people. The full oval outline of face, and the large features of almost European cast,were evidently individual or family traits, as they appear in the Tutelo half-breeds on the Reserve, who do not claim near relationship to Nikonha. Those who are familiar with the Dakotan physiognomy will probably discover a resemblance of type between this last representative of the Virginian Tutelos and their congeners, the Sioux and the Mandans of the western plains"

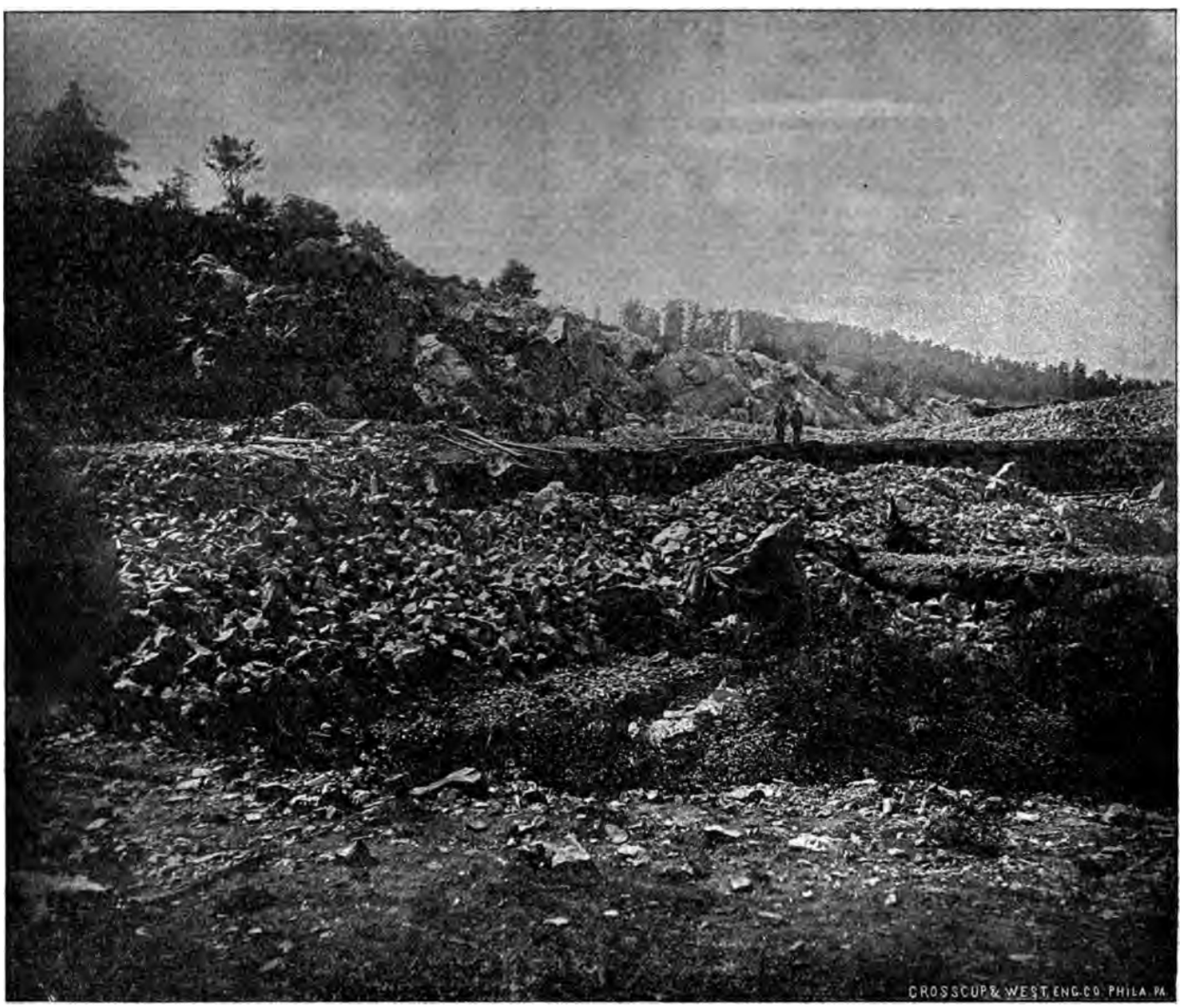
We have not now space to condense Mr.Hale's interesting statements concerning the language of the Tutelos, but will do so hereafter, with information concerning the Virginia Tutelos gathered from other sources.

The Lower Helderberg or No. VI. Limestones of Virginia.—In the former as well as in the recent (1884) edition of Mr. Andrew S. McCreath's report on "The Mineral Wealth of Virginia tributary to the lines of the Norfolk & Western and the Shenandoah Valley RR. Companies" this statement occurs: "The Lower Helderberg limestone forms a valuable flux for blast furnace use. It is reported to attain a considerable thickness on Massanutton Mountain; but generally it is not well represented south of the Potomac."

To the first statement of this extract we have no objection, since the experience of a dozen or more furnaces in Virginia and West Virginia for well nigh a hundred years has proved this not only a "valuable" but a superior "flux for blast furnace use." The "reported" Lower Helderberg *in* the S.W. Massanutton mountains is from the writer's report on the Shenandoah Iron Co's properties; it was the limestone used in Catherine furnace near which it outcrops abundantly. We do object to the incorrect statement that this limestone is "generally not well represented south of the Potomac."

In fact the Lower Helderberg limestones are nowhere *better* "represented" than they are in West Virginia and Virginia "south of the Potomac," if thickness of beds and numerous exposures of them over large areas of country are the tests of represenation. In eastern New York, where the formation received its name Lower Helderberg, Dana states the whole thickness of its beds as 400 feet, and that "South of New York, along the Apalachian region, they extend through N. J., Penn., Md., and Va., increasing in thickness, being in all 500 feet or more on the Potomac; and, as in the North, they dimish westward." Prof. Wm. B. Rogers, in his notes on the Virginia geological survey, in which he named these rocks Formation No. VI, says: "This is a limestone deposit varying in the northwest," south of the Potomac, "from 800 to 1,200 feet in thickness" In 1881 Prof. I. C. White measured this formation in New Creek ridge and Knobly mountain, south of the Potomac, and found it 1,050 ft. thick.

From the Potomac southward, on the western border of The Valley and in all the Apalachian region, in a belt of country 250 miles long and from 30 to 45 miles in breadth, thick beds of the rocks of this formation outcrop abundantly, in some places as the distinctive geologic feature of mountain ranges, like the great Bull-pasture, and in others as valleys. In the dozens of sections made across this belt by Prof. Rogers No. VI is almost invariably prominent. Any one at all familiar with the rocks of this group can readily recognize them in almost every mountain



Victoria Furnace, Va., Quarry, in Lower Helderberg (No. VI) Limestone.

pass of Apalachian Virginia from the Potomac to and beyond New river. Van Buren furnace is in a No. VI valley, where its rocks appear as cliffs, from which it draws it supply; Liberty furnace gets its limestone from bluffs of this formation; it is a prominent feature near Buffalo Gap furnace, Ferrol furnace Victoria furnace, Longdale furnaces, and Low Moor furnace, along the Chesapeake & Ohio Railway, where all the supply of flux for these furnaces is obtained from its thick beds. One of these quarries in No. VI we have selected for the illustration that heads this article, the one at Bell Valley station of C. & O. Ry., from which Victoria furnace obtains the great quantities of flux which its size demands.

The Lower Helderberg rocks appear as lofty bluffs, as at Price's, on the Richmond & Alleghany RR., and in the quarries of the Coral Marble Co., at Craigsville, on the Chesapeake & Ohio Ry.; they form part of the grand sections of the Norfolk & Western RR. along New river and outcrop as thick beds near the Bluestone branch of that railway, on the very borders of the Flat-top coal-field. In extreme Southwestern Virginia, along the Clinch and other Tennessee waters down to Cumberland gap, we find the rocks of formation VI.

It is fortunate for the Virginias that this fine limestone is so abundantly and widely distributed among the iron ore bearing rocks of her Apalachian territory, and in immediate proximity to the extensive iron ore deposits that characterize that territory, thus adding largely to their advantages for the cheap manufacture of iron.

Victoria furnace, near Goshen, Va., on Ches. & Ohio Ry., is now being relined and will go into blast about the first of Sept. A large force is now at work in the mines that supply this furnace, so it will commence operations with a large stock of ore on hand, one that will be needed in view of the increased capacity for production the refited furnace will have.

An electrical storm, of unusual violence, occured at Staunton, Va., during the night of July 5th. The day had been very sultry, the air close and unusually moist for this locality. It was evident during the day that the atmosphere was highly charged with electricity. After dark flashes of sheet lightning were visible all around the horizon. About nine o'clock the moon was unusually bright and the atmosphere apparently clear, but soon afterwards a halo appeared around the moon and a nimbus of considerable size surrounded it. Soon thereafter short flashes of lightning were visible in various parts of the sky. These displays continued until shortly after midnight, when sheeted and vivid flashes of lightning appeared in nearly all parts of the horizon, extending to considerable heights. Soon after this, about half past one, rumblings of thunder were heard, and the electrical displays increased in frequency and intensity, attracting general attention, so unusual was their character. A moderate rain fall took place about two o'clock, accompanied by thunder and lightning. After this the electrical displays were less frequent, but it was some time before they ceased. This storm produced a complete change in the condition of the atmosphere,which had continued quite sultry up to nearly midnight. The air became buoyant and elastic, and in the condition that it usually is at this time of year in this region which has a general elevation of about 1,400 feet above the sea level. The following day was an exceedingly pleasant one, the air elastic and a fresh breeze blowing most of the day, which was perfectly clear throughout ; the first clear day, and one without rain in this vicinity for more than a month. This electrical storm seems to have restored the atmosphere of this locality to its normal condition.

Collegiate education in Virginia.—The "Religious Herald," of Richmond, Va., asks why there are only about 500 young men from Virginia now studying in the academic departments of all the Virginia colleges. It insists that there ought to be at least 5,000, and suggests, as one reason why so few are in attendance, that the professors of these institutions do not visit the people at their homes and show them the importance, when they are able, of sending their sons to college.

The Falls of South river of the Rapid-Anne, near the foot of the Blue Ridge, on the line of Madison and Greene, counties is described by a correspondent of the "Culpeper Exponent" in a way that would indicate that they are worth a visit. He describes them as a descent of at least 80 feet, in two equal leaps. The first fall is into a stone basin, some 10 feet in diameter. The fall is in a narrow gorge on the southeastern slope of the Blue Ridge. Near it are lofty cliffs on the crest of the Ridge that add to the picturesqueness of the scene around them. These falls are but a few miles from Swift-run gap of the Blue Ridge, across which a turnpike passes to Elkton station of the Shenandoah Valley RR.

Kilby lake, from which Portsmouth, Va., proposes to draw its water supply, is described by the "Norfolk Virginian" "as about five miles long, much of the way about a quarter of a mile wide, and from ten to twenty-five feet deep. It is fed, in a great part, from subterranean springs and from surface drainage. Its capacity is several million gallons a day, enough for Norfolk and Portsmouth for several years, and could be further increased. When put into a bottle it looks almost as clear as cistern water."

This lake is about 2 miles from Suffolk ; it was selected as a source of water supply by engineer McAlpine. A sample of its water has been sent to Dr. Mallet for analysis.

The Atlantic & Danville RR., is now completed to a point in Sussex county, 13 miles west from Waverly station, of the Norfolk and Western RR. Its construction is now being pushed to Hickford, a point on the Petersburg & Weldon RR.

Schools.—We desire to call the attention of those of our readers that have sons or daughters to educate to the schools that are advertised in *The Virginias*. We have no hesitation in saying, from personal knowledge in such matters, that there are no safer, honester, or better schools in the Union than these, and this is saying much.

The price of gas, in Philadelphia is, at this time, $1.70 per thousand feet, and it is probable that next winter the price will be reduced to $1.50. If gas can be sold at a profit it Philadelphia, when they pay so much per ton for bituminous coal, as it is stated they now do, it is a very pertinent question to ask, in other localities where the cost of coal is much less, why the price of gas should be so much higher.

The study of English.—President Eliot of Harvard, Mass., University in an address at the last commencement of that institution, maintained, with great force and decision, that English should be studied as a science from early school life to the end of the college course. He admited that this opinion is a wide departure from the theory of most American colleges, and that the transition would probably be attended with difficulty, but new and better ideas are now growing in favor and he considered this one of the most important.

Lime Burning is becoming quite an important industry in nearly all parts of the Valley of Virginia. Kilns have recently been started in the vicinity of Charlestown, Jefferson county, W. Va.,at Roanoke, Va., and elsewhere. There is no better fertilizer for the lands of the Valley than the lime burned from its limestones, and it would pay every farmer to have a kiln of his own so he could give every field he plows up an ample top-dressing of lime.

It would be greatly to the advantage of every portion of Eastern Virginia if its farmers would apply lime to their lands, and now that so many railways connect the Valley and the country east of the Blue Ridge, we see no reason why lime burning should not become a large and profitable business, especially if the lime burners could induce the farmers to use it.—The free use of lime in Md. and Pa. has made many farms in those states very gardens in production.

"The Mineral Wealth of Virginia tributary to the lines of the Norfolk & Western and Shenandoah Valley Railroad Companies, By Andrew S. McCreath, chemist to the Geological survey of Pa., etc," is the title to a handsomely prepared and published volume of 158 pages, for a copy of which we are indebted to the accomplished author.

This a "second and enlarged" edition of a report with the same title published in 1882, made necessary by increased development in the region traversed by these railways and by their extensions into new territory, notably the Cripple creek iron region and the Flat-top coal field. Associating with himself Mr. Franklin Platt, of Philadelphia, Mr. McCreath in 1883 and 1884 re-examined the mineral resources of the country tributary to these railways and made numerous new analyses of its ores, coals, etc., enabling him to present much valuable information not contained in the first edition of this very valuable report.—We have only time now to call attention to this report: we shall review it fully in our next.

Pocahontas coal mine output.—Vice-president H. Wickham, of Southwest Va. Improvement Co., furnishes *The Virginias* the following statement of the coal and coke business of his company at the Pocahontas, Tazewell county, Va , mines in May and June, 1884, in 2,000 lbs. tons.

	May.	June.
Coal mined	15,165	18,936
Coal shiped	11,402	12,312
Coal coked	6,178	6,624
Coke shiped	5,022	3,972

In May 2,415 tons were taken from stock for the coke ovens.

Continuing our report from page 72 we have:

Output from Jan. 1 to July 1, 1884:

Coal mined	120,374 tons
Coal shiped	78,131 tons.
Coal coked	44,658 tons.

Considering that fully two months of mining operations for this year were lost in consequence of the mine explosion of March 13th, the above figures make, so far, an excelent showing for 1884, one that promises an output of over 350,000 tons. This company has now opened its principal office at Roanoke, Va., where its vice-president, Mr. H. Wickham will live.

In this connection we add the following from the "Norfolk Virginian" of July 22. from an account of an interview, in Norfolk, with President Kimball of the N. & W. RR.—"Mr. Kimball expressed himself as being highly gratified with the progress of the work at Lambert Point, and says the coal pier and terminal track will be completed in time to begin operations in October. The explosion in the Pocahontas mine caused great delay in the work, as there was really little use for the pier so long as the supply of coal from this point was cut off. But the company has been hard at work at Pocahontas, and have arranged to have a supply of water always in the mine, as it is believed that the explosion was caused by the accumulation of fine dust in the mine. Not only will the Pocahontas mine be again in operation, but four other companies have been formed to develop coal in the New River section, and branch lines of the road will be built to their mines. In this connection Mr. Kimball confirms the statement made in this paper several days ago, that it is the purpose of the Norfolk & Western Company to extend, eventually, the New River division to the Ohio river, and such a line Mr. Kimball says, will put Norfolk in direct communication with Cincinnati and the Northwest, over a shorter route than that now afforded by the Chesapeake & Ohio."

The Belmont Vineyard, on the Blue Ridge near Front Royal, Warren co., Va., is described by a correspondent of the Baltimore "Sun," as probably the largest vineyard in the state, as it has over 100 acres in grapes of various kinds. This vineyard is provided with an excelent wine-celler. It is now owned by Dr. T. A. Ashby, of Baltimore, and operated by Mr. A. A. McKay. This vineyard was planted many years ago by Mr. Marcus Buck, and the success that has attended its cultivation proves conclusively that what we have so often said about the Blue Ridge as the wine-growing region of the Atlantic Highlands is in every respect true. By constant attention and observation Mr. Buck brought this vineyard to a high degree of perfection. It would be a boon to our state if his recorded notes, made through nearly a score of years, could be published. We question whether anyone ever made a more thorough study of the question of viticulture and wine making in the U. S., than did this diligent and accomplished gentleman.

The Cripple Creek extension of the Norfolk & Western RR. we stated in our June number would be the subject of illustration in this number of *The Virginias*; the suspension of work on that branch, of which mention is made on page 122, has induced a postponement of the publication refered to. The map of that extension, and a description of the region it traverses will be published hereafter.

In this connection we take the liberty of making the following extract from a letter from President F. J. Kimball, of the N. & W. RR., under date of July 18th: "I hope and believe that the delay in the completion of the Cripple Creek extension will be but temporary. We have less regret in stoping the work owing to the fact that there was no immediate propect of business from that line. The iron business is so dull, and the parties in the Cripple Creek region hold their properties so high that there is very little prospect of any immediate return for the expenditures which we have and will be compeled to make in order to complete the work. With the revival of business, however, which is sure to come sooner or later, I have no doubt but that we will go ahead."

Cincinnati Iron Market Report.—Under date of July 21, 1884, E.L. Harper & Co., send the following report, especially prepared for "*The Virginias:*

There has been no marked change in the market since our last report. Supply has been somewhat in advance of demand on account of the midsummer stoping of mills for repairs, and the comparatively limited summer work of the foundries. General buisness has been but moderate for 60 days past, and hence the consumption of crude iron has been abridged and the usual July renewals of contracts for pig iron postponed by some until August. An extraordinary bountiful harvest is assured, which gives promise of ease and prosperity to the farmers, who have taken up from the manufacturers of the best agricultural implements about all the machinery they had for sale. The financial "squeeze" has demonstrated that the general trade is on a solid basis, and indications favor a good average fall business in spite of the exciting political campaign before the people. The 425 blast furnaces quiet, leaves the number operating only 278, so that there can be no excessive accumulation of iron, and prices, it may be expected, will be better as the fall approaches with an improved business. The local conflict between the stove manufacturers and the moulders' union continues. The surrender of one of the manufacturers yesterday in no way affects the others who are runing and will run their foundries independently. Inquiries for prices on crude and manufactured iron are increasing and the market closes with a cheerful spirit.

We quote as prices current, at 4 months, as follows:

Foundry.			
Virginia strong neutral coke No. 1, at	$17.75	to	$18.25
" " " " No. 2, at	17.00	to	17.50
" strictly warm-blast charcoal, at.....	21.25	to	21.75
Southern cold blast, at.....	26.00	to	26.50
American Scoth, at.....	18.00	to	18.50
Gray Forge.			
Virginia strong neutral coke, at..	$16.00	to	$16.50
" cold-short, at	15.50	to	16.00

Low Moor furnace at Low Moor station of Chesapeake & Ohio Ry., Alleghany county, Va., made 22,726 tons of pig iron from Jan. 1 to July 19, 1884, an average production of about 812 tons per week. The largest product was 873 tons for the week ending July 19, and the least was 701 tons the second week in January.—Few furnaces in the country can show as regular an output of pig iron of uniform grades as Low Moor, and from what we learn but few during this period of depression furnish more satisfactory results to their owners.

The Roanoke Machine Works, at Roanoke, Va., at the junction of the Shenandoah Valley and the Norfolk & Western railways, is one of the best appointed and most active industrial establishments of Virginia, and may claim high rank among such establishments in the United States, since during the first year of its business operations it turned out more than a million dollars worth of work. In response to a request for information concerning the work of this great establishment we have received, under date of July 17, a very interesting letter from Mr. S. B. Haupt, the efficient superintendent of these works, from which the facts for the following statement of things done, from Sept., 1883, to July 17, 1884, are obtained:

In the car department during these 10 months there have been made 673 hopper-bottom gondola cars and 386 box cars, and the capacity of this department has been worked up so it can now readily turn out 8 cars a day.

In the locomotive department 9 consolidation locomotives are now in course of construction: one of these has been completed and will soon be put into service on the Shenandoah Valley RR. (We believe this is the first engine of this kind that has been built in Virginia). This new engine has been given a thorough trial and found to be entirely satisfactory in every respect. The second engine of this class will be completed by the last of this month. Orders are now on hand for 15 locomotives, giving a promising outlook for the future of this department. On a recent visit to these works we were shown several important particulars in which these "home-made" locomotives were superior to any that could be purchased elsewhere.

The foundry of these works has been doing a good business, having turned out in these 10 months 4,400,000 lbs. of castings of various kinds. Some 400,000 lbs. of plate girder-bridges, for strengthening the bridges of the N. & W. RR. have also been furnished.

A plant for car-wheels has recently been added, and on the 16th the first lot of wheels was cast. A test of these showed that the patterns, chills, etc., were perfect in every respect, so that now car-wheel making can go right along at the rate of 45 a day if necessary. This is a most valuable addition to the works, "inasmuch as we are right in the midst of superior iron for that class of work," says the superintendent.

In the repair shops 91 old locomotives have been overhauled and put in good condition, and so have a number of stationary engines. During the same time 289 old freight and 21 passenger cars have been repaired or rebuilt.

In addition to its car and engine work this company furnishes from its storehouse railway supplies to the N. & W. and the S. V. railways, enabling those companies to dispense with storehouses for such supplies, which by this arrangement are concentrated at one point where they can be handled more economically than they could be if held at and distributed from several points. Most of the articles used are manufactured here, thus securing good materials and workmanship and a saving in cost.

In his annual report for 1883, the president of the Norfolk & Western RR. Co. makes the following remarks: "The capital stock of the Roanoke Machine Works is $365,300. There is also a mortgage upon its property securing $500,000 of bonds which are held by your company.

The works were so far completed July 1st, 1883, as to permit of the commencement of repairs to the equipment of the Norfolk & Western and Shenandoah Valley railroads. The works were entirely completed, and the construction of new equipment was begun towards the end of the year.

The works have been constructed in the most thorough and substantial manner, and their convenient location and the complete equipment of the shops enables work to be performed at a minimum of expense. The requirements of your company are such as to necessitate the working of the shops to their full capacity, and justify the large expenditure that has been iucured in their construction."

The Coal and Coke traffic of Ches. & Ohio Ry. for June, 1883 and June, 1884, are shown in the following table compiled for *The Virginias*, from official returns, by J. W. Hopkins the fuel agent of this railway.

Kind.	1884.	1883.	Increase.	Decrease.
Cannel	1,337	4,223	....	2,886
Gas	20,242	38,741	.....	18,499
Splint and block	9,112	5,748	3,364	.....
New River, &c	31,073	27,847	3,226	.....
Coke	5,124	7,674	.....	2,550
Totals	66 888	81,233	*6,590	23,935

The distribution of the above was as follows:

		1884.	1883.
1.	To Ches. & Ohio Co. for its own use	15,008	14,706
2.	To Huntington, for West via. Ohio river		3,534
3.	On Elizabethtown, Lex. & Big Sandy RR	2,883	924
4.	On Ches. & Ohio RR., excepting Richmond	9,929	12,152
5.	To Rich. & Alleghany RR. at Clifton Forge	215	852
6.	To Valley RR. of Baltimore & Ohio at Staunton,	....	.....
7.	To Shenandoah Valley RR. at Waynesboro	....	....
8.	To Va. Midland at Charlottesville	1,478	4,429
9.	To Rich. Fred. & Potomac RR., at Junction	..	679
10.	To Richm'd for consumption, includ'g tugs, &c,	9,601	10,937
11.	To James River wharves for shipment	9,530	13,953
12	To Newport News, For consumption, &c	436	120
	To Newport News, For shipment	17,078	21,947
	Totals	66,888	84,233

The movement from January 1st, 1884, to June 30th, 1884, inclusive, and for same time in 1883, was as follows:

	1884.	1883.	Increase.	Decrease.
Cannel	6,731	14,767	.....	8,036
Gas	155,597	192,111	.....	38,514
Splint and Block	38,823	51,463	.....	12,635
New River, &c	220,663	208,818	11,845	.....
Coke	28,131	55,047	.....	27,916
Totals	449,950	525,206	11,845	87,101

The Baltimore and Ohio Telegraphic Alliance has been formed by the consolidation of the B. & O., the Postal and the Bankers & Merchants telegraph companies into one company that will go into operation the 1st of August. The mileage of this alliance is now one-third that of the Western Union and it reaches most of the important points of the country; it will also control the Mackey-Bennett cable, just completed. The Baltimore & Ohio was the first railway in the country that had a telegraph line along it, and it encouraged the construction of the first telegraph line put up in this country.—There is a general expression of gratification that we are at last to have an efficient and enduring competition in the telegraph business of this country. The B. & O. is slow to move, but when it does move it moves steadily and surely.

Gold milling.—A gentleman interested in the Potomac Manufacturing Works of Alexandria, in the city to-day, says the company owning those works have made arrangements for the immediate erection of a thirty ton copper furnace with three runings a day for the refractory gold ores of North Carolina, which assay at $30 to $40 a ton, and which can be delivered at Alexandria for $10 a ton.—*Gazette.*

Growing up with the Country.—It is beyond dispute that the West and Southwest have given wealth and prominence to many thousands of emigrants from the older states who have settled there under favorable circumstances. Heads of families who turned their faces towards the seting sun some thirty years ago, before the era of enormous grants of land to the Pacific railroads, were able with the few hundreds of dollars they took with them to buy themselves good farms, their little capital sufficing to give them a good start. Hard labor for many years in the midst of unhealthy and barbarous surroundings was the price the most successful had to pay for the prosperity that was ultimately attained. Many succumbed to the difficulties of their situation, and not a few returned to the East bankrupt, broken in health and spirit for the rest of their days. Another class of emigrants whose venture west of the Mississippi was still more hazardous was composed of young men, who, influenced by Mr. Greeley's advice, went West without any capital but their strong arms and brilliant expectations. After years of hard manual labor in the employment of the capitalist class who owned the land, these young men often accumulated money enough to buy farms of their own, and in their turn became employers of labor. Instances occured where lucky individuals made great fortunes in a few years, and returned East to dazzle their friends with their speedily acquired wealth. Particularly was this the case during the period of bonanza mining, when every happy turn of the speculative market or discovery of a rich mine created a new Crœsus. But even at that period the failures were far more numerous than the successes. Every big fortune was built on the ruins of a thousand little ones, and for every young man who "struck it rich" there were hundreds who "struck it" very poor, and, if unable or ashamed to return home to acknowledge their failure, sank unnoticed to the condition of a hopeless day-laborer, to perish ultimately of exposure or dissipation. The depth of moral depravity to which men sank under these unfavorable circumstances is revealed, in a rather light vein, in such "idyls" of Bret Harte as "Tennessee's Pardner," "The Outcasts of Poker Flat" and "The Heathen Chinee." Much less attractive is the outlook presented today to young men of the Atlantic states who, with or without capital, would expect to find in the West or Southwest a career of assured success free from hard conditions. A subscriber of "The Sun" sends us a letter fro n his son, whose experience may be cited as a typical one. This young man, aged 17, left his home in Virginia in March last for Texas, expecting to find a choice of employments. On his arrival at San Angela, being out of money, he sought employment, but did not find it so easy to get as he had anticipated. He took the first offered him, "which was a place of waiter in a hotel." Subsequently he found less disagreeable work "at a brick-yard." The moral of his experience is not far to seek The same efforts young men are compeled to put forth in the West, if applied at home, in the Atlantic states, where labor is as much in demand and its rewards more valuable, would produce better results, in a pecuniary as well as in a moral and intellectual point of view. Maryland and Virginia, for example, offer to the industrious man the prize of cheap lands, healthful, well situated and convenient to all the resources of modern comfort and civilization. The rational emigration movement of to-day would be from the West to the East, from the North to the South, Nowhere in the United States can the thrifty laborer make a better living, or have a better chance to improve his condition, than in the states of Maryland, Virginia and North Carolina, and especially in those portions of them where county taxes are low and the road supervision honest and effective.—*Baltimore Sun, June 27, 1884.*

The Southern Stove Works at Richmond, Va., says the "Metal Worker," of New York city, are offering the trade a variety of ranges, stoves, heaters, fronts, grates, fenders, &c., which show a good deal of well directed enterprise on the part of the management. This is one of the few establishments located south of the Potomac which is seeking to nationalize its business, and we regard it as a gratifying indication that our southern friends are appreciating the importance of extending and diversifying their manufacturing industries and widening the scope of their commercial relations. The city of Richmond has a great many advantages as a manufacturing centre by reason of its location, railroad facilities and water power. The excelent quality of Virginia iron is well established, and it can be delivered at Richmond at prices as low as can be had in any market in this country. It is also favorably situated for cheap fuel, and enjoys the advantage of low freights in all directions. Messrs. Loth & Warren are the proprietors of the works. Their leading specialties are the "Conquerer" and "Shockoe" ranges, the "Virginia" cook, the "Farmer's Favorite," box stove for wood, and the "Pinafore" cannon stove, besides a large variety of fronts and grates.

The Coal and Coke traffic of Ches. & Ohio Ry. for April, 1883 and April, 1884, are shown in the following table compiled for *The Virginias*, from official returns, by J. W. Hopkins the fuel agent of this railway.

Kind.	1884.	1883.	Increase.	Decrease.
Cannel	1,800	538	1,262	.....
Gas	32,352	38,369	.....	6,016
Splint and block	4,926	8,355	....	3,429
New River, &c	37,784	38,965	.....	1,181
Coke	4,098	9,142	.....	5,044
Totals	80,961	95,369	1,262	15,670

The distribution of the above was as follows:

		1884.	1883.
1.	To Ches. & Ohio Co. for its own use	19,328	26,395
2.	To Huntington, for West via. Ohio river		3,358
3.	On Elizabethtown, Lex. & Big Sandy RR	772	3,603
4.	On Ches. & Ohio RR., excepting Richmond	13,561	17,102
5.	To Rich. & Alleghany RR. at Clifton Forge	292	2,294
6.	To Valley RR. of Baltimore & Ohio at Staunton,	....	.....
7.	To Shenandoah Valley RR. at Waynesboro	27	31
8.	To Va. Midland at Charlottesville	5,884	6,638
9.	To Rich. Fred. & Potomac RR., at Junction	111	159
10.	To Richm'd for consumption, includ'g tugs, &c,	5,659	8,900
11.	To James River wharves for shipment	9,230	5,833
12.	To Newport News, For consumption, &c	920	407
	To Newport News, For shipment	25,077	20,739
	Totals	80,961	95,369

The movement from January 1st, 1884, to April 30th, 1884, inclusive, and for same time in 1883, was as follows:

	1884.	1883.	Increase.	Decrease.
Cannel	3,463	8,835	.....	5,372
Gas	107,747	120,419	.....	12,752
Splint and Block	25,906	37,791	.....	11,889
New River, &c	161,349	144,758	16,591	.....
Coke	18,648	70,908	.....	22,260
Totals	317,113	352,794	16,591	52,273

The Danville & New River RR. has its chief engineer, Capt. Adams, in the field examining the country for a route for the extension of that road from Patrick C. H., by Hillsville, to some point in Wythe county, near the mouth of Reed creek, where it can connect with the proposed Va. & Ky. RR.

White Pine Interests of West Virginia.—In the "Northwestern Lumberman" of July 5, 1884, we find the following letter from Ronceverte, W.Va.: "Some readers of the Lumberman may think it a bold assertion for me to make, that within a radius of 100 miles from this little town there are from 400,000,000 to 600,000,000 feet of standing merchantable white pine. It is true, however, and, from all facts gathered, the indications are that the amount is underestimated. Were there sellers of pine land or unscrupulous agents giving estimates the deduction would be that the maximum amount would not reach the first named figure, but the data for the statement were obtained from parties who had no inducement to have a large showing, and all this is accessible, the most of it tributary to, and can be run down the Greenbrier river. There is a large amount of pine on the river and also on Deer creek, Sitlington creek, Anthony creek and Knapp creek. All this will come down the Greenbrier, and none of the tracts are over 80 miles from Ronceverte.

On the headwaters of Laurel creek, Monroe county, there was a tract of 30,000,000 feet. Within a few years 25,000,000 have been cut. At the headwaters of Glade creek, in Raleigh county, there are several thousand acres. There is also quite a large tract on the Bluestone creek, in Mercer county. This creek flows into New river six miles above Hinton. At this place William James & Sons get out 800,000 feet every year.

White pine in West Virginia is found only on the most elevated portions of the mountains where hardwoods do not reach their best development. Riding along the Chesapeake & Ohio railway the line between the sunny and the more exposed slopes can be distinctly seen—the pine on the rugged side and the hardwoods where there is more sun and less cold and driving storms.

While the size and quality of this pine is not equal to Michigan it is a fair product, and the manufacturers find a ready sale in Philadelphia, Baltimore and other eastern cities. It has not as yet been much used in New York city, but will doubtless find its way there and be favorably received before long. Only a short time ago there was a call from a company on the coast for two pieces of long timber. The specifications called for 60 feet in length and 24 by 24 inches square. These were supplied by E. M. Nettleton from Laurel creek, and were every way satisfactory. Here is evidence, solid as a rock, against which skeptics in regard to good white pine in this state may butt their devoted heads.

The timber in Raleigh county is sound but rather smaller than on the other tracts. It is, however, very good for bill stuff, and is accessible and merchantable There is profit in handling it, and it will all, in time, reach some market.

The great centre of the manufacturing of white pine is at this place. Ronceverte was settled many years ago by some French emigrants from the St. Lawrence river in Canada. Observing an indigenous plant abounding which they called *ronceverie*, meaning the green brier, they named the place accordingly, and from this came the name of the river. There was, in the early days, no bridge, and the ford at this place was called by the settlers the St. Lawrence ford, which afterwards suggested the name of the company now manufacturing white pine at this point. Several years ago a bridge was constructed, and the impetus given to the settlement by the energetic lumbermen soon displayed itself, and it became a thriving place. During the war it suffered to some extent, and the contending armies both passed through the place. On the heights was a Confederate fort, and there are yet some ugly mementoes visible. At one office I noticed that one of those wicked-looked, conical iron pills of former years was used as a weight to keep the door from slaming shut. At present there are nearly 1,000 inhabitants, and the village is now a municipality, an incorporated city, with a mayor, and I am pleased to say that the honorable mayor is one of the prominent lumbermen of the place—Col. E. C. Best, general manager of the St. Lawrence Boom and Manufacturing Company. It is safe to state that he is the first best mayor of the city.

The St. Lawrence Boom & Manufacturing Company commenced its existence about 10 years ago. The company consisted of Wm. L. Rawson, B. Hurxthal and J.D. Carter. They built a temporary dam, put in a boom and erected a mill, and commenced manufacturing. Considerable outlay was made in improving the river, and the business progressed favorably. On account of other business interests the first company sold out in 1881 to the gentlemen comprising the present company, who remodeled and improved the mill, and started up. After runing four days the mill was destroyed by fire. This would naturally seem disastrous to the concern, but not so really. There had been built, some quarter of a mile up the stream, a mill designed for both hard and soft woods, by a company styling itself the Greenbrier Lumber Company. The St. Lawrence Boom & Manufacturing Company promptly bought the plant, with the stumpage and logs belonging to Carnahan & Scully, and pushed manufacturing with that mill while the company built a new one near the spot where the burned one was located. The mill was constructed in a most perfect manner with all modern improvements. A 250-horse-power engine now runs one gang, one circular, one mulay, one double edger, a single edger and picket and lath mills. The capacity for sawing is 120,000 feet per day. At present the mill is cuting 80,000 feet, and 27 men are employed in it. The mill purchased of the Greenbrier Company is now used for a shingle mill, planing and molding mills, and they are kept runing daily. The product of the saw mill is mostly inch boards, 12, 14 and 16 feet long, although some plank and dimension stuff is manufactured; also large quantities of laths and pickets. The yard of the mill extends down the river, with ample tramways, and very large quantities are on sticks. A track from the Chesapeake & Ohio Railway runs through the yard, and work is now in operation to make a branch, so that soon there will be two tracks, and there will then be excelent facilities for loading cars, which now are a little cramped at times when the different qualities have to be moved from one tramway to another for loading.

Only sawdust is used for fuel in the mill, and to dispose of the offal a huge bonfire is kept constantly blazing on the opposite side of the river. This is reached by a convenient tramway. Considerable of the refuse is being utilized in improving the river front and low places. It is packed in closely and covered with loam and soil. A substantial dam has been built, and the lower or distributing boom extends up the river about three miles, with a sufficient number of pockets to make everything secure. The capacity of the distributing boom is 10,000,000 feet. About six miles up the river commences the upper or storage boom, the capacity of which is about double that of the distributing boom.

In this vicinity in Pocahontas county, the company has 22,000 acres of land, and estimates that it has a supply of logs, at an annual cut of 15,000,000 feet, to last at least twenty years. About 150 men are employed in the loging camps during the winter, and a better fed lot of workmen cannot be found in the United States. There are peculiar features in this direction. It is not like having a line of supplies to transport a long distance into the woods. There are supplies ever at hand, and two beeves are killed each week, so that fresh meat may be had every day. The president of the company said to me, "I sometimes have to work the men with very little rest for 48 hours, and the best way to keep

them in good humor is to feed them well. If I did not do so I could do nothing with them."

The cost of the new mill was $40,000, and the whole plant, including improvements in the river and booms, cost $100,000.

The officers of the company are: John Driscol, president; E. H. Camp, treasurer; J. M. Kinparts, secretary, and E.C. Best, general manager. The company is composed of Pennsylvanians. They are all practical lumbermen, and have therefore met with the success deserved and expected.

The station on the Chesapeake & Ohio railroad is within a stone's throw of the company's office, and the sidings give an excelent opportunity for shiping.

Sometimes the river gets on a high old picnic, and tears down with threatening power. This occured the middle of this week, but everything was so secure that no logs were lost. Although the water was high and ran over the railroad track at some places not far from Ronceverte, it did not interfere in the least with the operations of the mill.

Having facilities for manufacturing hardwoods the company occasionally saws to order poplar, walnut, ash, and oak. The Domestic Sewing Machine Company, of New York, has quite a quantity of walnut lumber which was manufactured by the Greenbrier Lumber Company, stuck in the upper yard. It is presumable that storage is not expensive in this country, or the lumber would have been removed long ago.

In the year 1880 a Mr. Withrow and E. M. Nettleton bought white pine timber estimated to cut 30,000,000 feet, on Laurel creek, in Monroe county. They cut off and sold 24,000,000. The first two years of their cuting they furnished the Chesapeake & Ohio Railroad Company 12,000,000 feet. Mr. Withrow wished to retire from the business, and the partnership was dissolved. They had made the nice little sum of $64,000, which they divided, and E. M. Nettleton continued the business alone. Three mills were run at first, but now only one is used. That one is on the creek six and one-half miles from Tuckahoe station, on the Chesapeake & Ohio, where all the product has to be hauled. Mr. Nettleton gives his attention particularly to the sawing of timber orders. He thinks that he will clear out the entire portion of that tract left in about two years He has a beautiful farm and home at Covington. As I rode along I could see from the car window his extensive fields of wheat waving in the wind. Mr. Nettleton is a business man of broad ideas and can farm, and doubtless do many other things as efficiently as he can manufacture timber and lumber.

Besides the interest of William James & Sons, at Hinton, there are several small operators along the line of the railroad and back in the creeks who bring in supplies in small quantities. I noticed piles of pine lumber at several stations.

There are quantities of hemlock in this part of the state. The natives call it spruce pine. There are large forests of this wood on Anthony creek, with good timber. At present nothing is done with it. It would be an excelent place for some one to start a tannery.

Spruce abounds in some places. This tree is designated by the inhabitants as yew pine. There are some extensive forests of the black spruce in the most rocky regions of this part of the state, but at present absolutely inaccessible. A description is therefore useless.

Norfolk & Western Railroad.—An estimate of the earnings of the Norfolk & Western Company for the current year places the surplus at nearly $500,000. It is probable that this will be devoted, as it was last year, to improving terminal facilities at Norfolk, &c. If any dividend is declared either in July or January, it is likely to be paid in scrip.

The Virginia Farmers' Assembly.—Dr. John R. Page, secretary of the local committee, University of Va., has issued the following plan, proposed under the auspices of the Virginia State Agricultural Society, for the meeting of the assembly of farmers.

In selecting Charlottesville as the place for the first assembly, we felt sure that our life-members, and the farmers generally in this and the adjoining counties, will give us a hearty and earnest support, and enable us to make it so successful as to recommend its adoption in all the different sections of the state.

The objects of the assembly are:—1st. To bring together from all quarters of the state as many farmers as possible to discuss the articles written or spoken according to the program, and to bring out all the facts tending to develop the resources and possibilities of agricultural pursuits, as well as to elevate the avocation to the plane where it properly belongs, as affording opportunities for the highest culture of man with the greatest happiness and enjoyment.

2nd. To present in an attractive form the observations and experiences of practical farmers on the different systems of farming, and the different usuage that prevail in different parts of the country.

3rd. To bring out clearly and make known the practices of good farmers, that they may be adopted; and the objectionable practice of bad farmers, that they may be condemned.

4th. To encourage farmers to form neighborhood clubs and county societies, in order to incite a free interchange of ideas and opinions on all subjects relating to their interests in agriculture.

5th. To adopt measures by which the mutual interests of all engaged in agricultural pursuits may be represented and voiced from the club of the neighborhood directly up to the State Agricultural Society, and thence on to whatever Federal or "National" agricultural organization representation may be desired; and thus to organize and exercise freely and openly, without ritual or secrecy, all the rights and privileges to which farmers are entitled by their occupation, by their general intelligence, by their vested interests, and by their numerical strength.

In the organization, consummation and success of the "Assembly" to meet in Charlottesville on the second Thursday in August, the life-members of the State Agricultural Society, and the farmers generally in this and the adjacent counties, are cordially invited to participate: and we would urge one and all to join hands with us to make it a success. We are intensely earnest in this matter, believing that the accomplishment will be of the greatest benefit to the farmers of the state. We trust, therefore, that this paper will induce all the clubs and societies in the state to send delegates; and where clubs do not exist, an effort will be made to get the farmers in the counties to send representatives. All who desire to participate in the movement and be present at the meeting, will please communicate with Dr. Page.

American Institute of Mining Engineers.—Secretary R. W. Raymond announces that the fortieth meeting of the Institute will be held in Philadelphia, begining Sept. 2, 1884. The attention of members and associates is called to the remarks of Dr. Frazer on this subject (see proceedings of Chicago meeting) and to the importance of promptly announcing their intention to be present at the meeting. Such notice should be sent both to the Secretary and to Mr. John Birkinbine, chairman of Local Committee, care of Engineer's club, 1523 Chestnut street, Philadelphia. Rooms may be engaged by direct application to St. George Hotel, corner Broad and Walnut streets, which has been selected as headquarters. Terms $3.50 per day.

The Cyclopean Towers of Virginia are well entitled to rank with the many natural curiosities of that state that are worthy of inspection by the lovers of the curious and wonderful in nature. These towers, or Natural Chimneys, as the people living near often call them, are situated on the banks of the North river of the Shenandoah in the northern part of the county of Augusta, 14½ miles due north from the city of Staunton and one mile east of north from the village of Mt. Solon.

Our illustration gives a good idea of the character of this fine group of natural towers, one of a line of somewhat similar objects that form part of a northward facing escarpment of horizontally disposed strata of the great beds of Lower Silurian or Cambrian limestones of The Valley of Virginia that bounds on the south and overlooks the lovely valley of North river of the Shenandoah. The same forces (probably a glacial flood) that opened a way for this river through Narrow-back or Little North mountain of the Apalachians, a few miles to the northwest, and eroded for it a plain-like stream valley, have carved these curious towers from the solid limestone rocks that here successfully resisted the southward rush of that flood and turned it eastward.

Howe's History of Virginia (1845) contains a rude illustration of these towers. It says of them: "The Cyclopean Towers, near the Augusta Springs, are among the greatest curiosities of nature in the Union. Yet for many years they were known only in the vicinity, and bore the rude appellation of "the chimneys." They are about 60 or 70 feet in height. We annex the following from a published description by a gentleman who visited the towers in 1834, and gave them their present name. It commences with a description of the country as he approached toward them:

After passing over a hilly and picturesque country, the road opened upon a fertile valley, which though in places narrow, was of considerable length—and when seen from an elevated position, appeared like the bed of an ancient lake, or as it really is, the alluvial border of a flowing stream. The strata of limestone hills followed their usual order of parallel lines to the great mountains of our continent, as though a strong current had once swept through this magnificent valley, forming in its course islands and promontories, which are now discoverable in numerous short hills and rocky bluffs that are either naked and barren, or covered with a growth of stately trees. It was at such a projection that we first descried the gray summits of what seemed a ruinous castle—resembling those which were raised in feudal times to guard the passes of the Rhine, or like such as are still seen in moldering majesty on many an Alpine rock. These summits or towers, of which there were seven, lifted their heads above the lofty elms like so many antique chimneys in the midst of a grove; but, on approaching them nearer, our pleasure was greatly increased to find them rise perpendicularly from a stream, which, winding around their bases, serves as a natural moat to a building not made with mortal hands.

These rocks in their formation resemble the palisades on the Hudson river—but are more regular in their strata, which appear to have been arranged in huge masses of perfect workmanship, with projections like cornices of Gothic architecture in a state of dilapidation. Those who are acquainted with the Cyclopean walls of the ancients would be struck with the resemblance."

We are indebted to Messrs. Waterman, Watkins & Co. for the accompanying sketch of the Cyclopean Towers, made by Mr. Gilbert, their talented artist, who is now engaged in sketching country houses, old churches, places of business, natural objects of interest, etc., in Augusta county, to be engraved and published in a large and and handsomely illustrated Atlas of that county, one that will contain a separate map of each of its magisterial districts, of Staunton, and of each of the important villages of the county, from actual surveys, besides the annals of the county from its origin. In justice to the artist's sketch we are bound to say that our cut is not a good reproduction of it; for that and all his other illustrations are real and artistic pictures.

The forest products of Virginia in 1870 and 1880.—In the census volumes of 1870 the forest products of Virginia by grand divisions, made the following meagre showing, leading to the conclusion that its forest resources were of comparatively little value:

Tidewater	$219.547	Blue Ridge	$2,397
Midland	227,749	The Valley	123.946
Piedmont	90.441	Apalachia	22.782
Total value of forest products			$686.862

The same 1870 reports gave Virginia credit for $2,111,055 worth of lumber, (including under that head laths, boards, planks, timber, shingles, staves, shooks, headings, etc.)—In Hotchkiss' "Summary of Virginia," published by the state in 1876, page 88, facts are given showing that these statistics did not, by any means, fairly represent the value of the forest products of Virginia in 1870.

The Agricultural volume of the census of 1880 furnishes the following statistics of the value of the *forest products of the farms* of Virginia in 1879, by counties. These we have, with much labor, added up by grand divisions, as given below. The census of regular lumbering operations has not yet appeared; the following figures simply represent the lumbering, wood-cuting, etc., done by farmers on their own farms:

Grand divisions.	Wood cut. Cords.	Value of products.
Tidewater	327,482	$776,199
Midland	592,802	884,298
Piedmont	446.779	529.816
Blue Ridge	109,818	114.677
The Valley	434.208	557.978
Apalachia	229.542	192,961
Trans-Apalachia	27,139	37,220
Totals for Virginia	2,177,770	$3,053,149

The first column represents the amount of wood cut, in cords, in 1879; the second the value of all forest products from farms sold or consumed in 1879.

The Tidewater counties whose farmers cut over 20,000 cords of wood were: Northumberland, Caroline, Hanover, and Nansemond; all counties near to cities where there is a market for wood; Hanover led in quantity.

Nine counties of Midland cut over 20,000 cords each, Pittsylvania leading with 134,403, followed by Halifax, its neighbor, with 76.139.

Most of the Piedmont counties exceeded a cut of 20,000 cords; Franklin led with 90,845, followed by Bedford with one of 56,934.

The Blue Ridge counties cut from 35,000 to 43,000 each, their cool climate demanding more fuel in proportion to population.

The Valley counties generally cut over 20,000 cords each, Wythe leading with 53,553, followed by Augusta with 53,279, and Rockingham with 44,274.

But five Apalachian or Trans-Apalachian counties cut over 20,000 cords each; Scott led with 62,137 followed by Lee with 52,664.

The counties whose farmers' forest products in 1879 were valued at over $50,000 were: New Kent, Chesterfield, Pittsylvania, Mecklenburg, Albemarle, Bedford, Franklin, Shenandoah, Rockingham, Augusta, and Wythe.

Among the states Virginia ranked 13th in the value of forest products sold or consumed in 1879, and 10th in cords of wood cut.

Cripple creek extension of Norfolk & Western RR.—The Associated press dispatch from Lynchburg, Va., dated July 10th, to the effect that the work on the Cripple creek extension of the Norfolk & Western RR. had been suspended for want of funds to pay contractors is not true. Before the company began work on the Cripple creek extension they sold $1,5000,000 of improvement and extension bonds with which to pay for this and other new work. The syndicate that took them had an option on $1,000,000 more, which, if taken, would furnish ample means to complete the contemplated improvements. The company determined that no work should be done beyond what was provided for in cash. Owing to the present financial depression, the last $1,000,000 of bonds have not been negotiated and the company has stoped the work until the funds for its completion are assured by the sale of the $1,000,000 of bonds refered to. The contractors have been promptly paid and are in funds to pay laborers and sub-contractors. The work has been suspended because the company would not go on with it beyond the cost of what was actually provided for by the sale of the bonds. They do not propose to borrow money in such a way as to pile up a floating debt for this or any other purpose. The company is abundantly able to meet all its obligations.

The Virginias.

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Staunton, Va., August, 1884.

Jed. Hotchkiss, Editor.

The Tutelo Indians.—Errata.—In the article on the Tutelo Indians, on page 112 of our July No., in the third line, for "Carolina trial" read "Carolina trail."—Since the publication of that article we have received the following letter from Mr. Horatio Hale, of Clinton, Ontario, Canada:

"I am much obliged for the copy of your valuable magazine containing the abstract of my paper on the Tutelo Tribe. I shall be glad to get the continuation when it appears.

The paper was writen some years ago. I searched many books and maps in preparing it,and cannot now recall to my mind where I found the statement that the Big Sandy was anciently known as the "Totteroy." "Chatteroi" and "Totteroy," however, may well be variations of the same Indian word.

There is a slight error in the transcription of the passage quoted in your last paragraph but one. The word "not" has been omited, as you will see, before "individual," somewhat confusing the meaning of the sentence. In general your abstract is quite correct and clear."

The General Assembly of Virginia is now in extra session for a few special objects, and yet an avalanche of corporation bills has already been precipitated upon it and there is every prospect that it will again embark in what can only be called the foolish business of enacting, at great loss of time and at large expense, special laws granting and changing charters—most of them never to be used, and many of them manipulated for the benefit of charter brokers, when the whole business could better done and at a tithe of the expense by a general corporation law, such as West Virginia and other states have so long had in successful operation.—Is there no one in the General Assembly with ability enough to carry through a good general corporation law and so put a stop to the nonsense business of enacting special charters, and thus greatly facilitate the development of Virginia ?

Gem furnace of Shenandoah Iron Co., Milnes station of Shenandoah Valley RR., Page county, Va. a correspondent of *The Virginias* writes, went into blast again, after thorough repairs, July 21st, 1884. Up to August 9th, a period of 20 days, it made 1698 tons; an average of 84.9 a day. A lot of poor coke was on hand when the blowing in took place, consequently the furnace did not work up to its capacity, but now a good article of coke is being used and better work and more of it is being done and the prospects are good for a large output and a successful run.

In the "Page News" we find the following:—"We are glad to say the Gem Furnace is again in full blast, and owing to improvements recently made they will be able to make more iron than before. The "Gem" is now under the management of our esteemed townsman, E. C. Crowther, Esq., and is working to perfection, as the following figures will show: On July 29th,they cast 105 tons and from present indications they will soon reach 110.

Railway prospects in West Virginia are encouraging although not much actual construction work is being done.

The Norfolk and Western is making good progress in the extension of its line down the Bluestone. into the Flat-top coal field in Mercer county, and by the end of the year the new coal mines of the Bluestone region, of which mention has lately been made in *The Virginias*, will have railway outlet to market. The engineers that have been runing an experimental line westward from this extension down the Bluestone river, up Crane creek and across Flat-top mountain at Peters gap and thence down Pinnacle creek of the Guyandot, and down that river towards the Ohio, reached the mouth of Rockcastle creek, at Pineville, Wyoming county, W. Va., Aug., 7th, and there suspended their survey and returned to Virginia. It was reported that this party would survey across Wyoming county by way of Rockcastle,Clear fork,etc., to Walnut gap of Guyandot mountains, to meet there the line surveyed by the St. Albans & Boone Co., RR. We do not know why this survey has been suspended. It looks as though the idea of a westward extension of the Norfolk & Western has been abandoned, at least for the present.

Senator J. Don Cameron, J. M. Cameron, E. Blanchard, B. Brickerhoff and E. V. De Invilliers, of Pa., accompanied by Senator J. N. Kenna, Judge James Ferguson, and others of West Va , have just returned from an inspection of the Elk river country of W. Va., in which, in Clay county, Senator Cameron owns large bodies of coal and timber lands, having crossed over from Weston, which is now connected with the B. & O. RR., at Clarksburg by a narrow-gague railway, and down Elk river to Charleston.—It is hoped that this exploration may lead to an extension of the Clarksburg & Weston road to Charleston, opening up a coal, timber, farming and grazing region of almost unsurpassed excelence.

Certificate of incorporation has been granted to the West Virginia & Ohio RR. Co., which proposes to construct and operate a railroad from Bluestone river, Mercer county, W. Va., not far from Pocahontas, by the most practicable route,to Big Sandy river, at or near its confluence with the Ohio, in Wayne county, W. Va. The principal office of the company is to be at No. 400 Chestnut St., Philadelphia. The capital stock is fixed at $100,000 divided, into 2,000 shares of $50 each, and the incorporators, all of Philadelphia, who have taken 20 shares each,are Henry M. Hoyt,B. K. Jamison, S. W. Jones, J. Dickinson Sargeant, Thos Graham and George Biddle. The proposed road is intended to be a continuation or connecting link of the Norfolk & Western system.

The Baltimore & Ohio RR. is constructing a new and better line through the city of Wheeling; is pushing its Connellsville extension south of Uniontown, and working a large force on the northward branch from its main line at Fairmont to Morgantown, along the Monongahela, making it certain that in a short time this great railway system will have a connecting road in operation between Fairmont and Connellsville.—The W. Va. & Pa. RR. is locating and may also build a railway along the Monongahela.

The W. Va.Central & Pittsburg RR. has been completed across the "divide" at the head of the North Branch Potomac to Thomas station, and will soon begin the shipment of coal and timber from the wonderfully rich basin of the Blackwater of Cheat river. We have no doubt but that this railway will eventually be constructed to some point on the C. & O.

In this connection the following from the "Wheeling Intelligencer." is suggestive:

"West Virginia's lack of people is not to be accounted for by any single cause, but the almost phenomenal dearth of

railroad facilities is one strong and obvious reason. We have a little railroad on the Ohio river—a good begining for which we have waited and striven long. There is a great railway highway through the southern end, and another through the northern. Besides these lines there is nothing to speak of. But of late the pulse of improvement has quickened; a few short local roads have been built, two or three others have been canvassed with every prospect of being built soon, and countless projects of more or less merit have been put on paper with the reasonable certainty that at some time, as circumstances may favor or discourage, some of them of great importance will be in operation.

Of late the attention of capital has been attracted to West Virginia as never before, largely, it must be said, through the efforts and connections of Senators Camden and Davis. These men are fortunately so circumstanced that they had money of their own to back their faith, and they have been able to command for their projects the confidence of outside capital having no sentimental interest in West Virginia. By all the signs West Virginia has seemed to be on the point of a general and wholesome awakening. The people have seemed to show an appreciation which capital well understands as of practical value."

Iron shipbuilding at Richmond, Va.—An effort is being made by the citizens of Richmond, Va., to direct public attention to the many advantages for iron shipbuilding presented by the James river. The railroad facilities of Richmond have within recent years been very greatly improved, and that city is now an important railroad center, having connections with the North, South and West of the best character. The iron and coal resources of the state are also being developed with gratifying rapidity, and a plentiful supply of the raw material for building iron ships is insured, and at moderate cost—considerably under the cost of our Northern iron. An appropriation was made at the recent session of Congress for the purpose of deepening the James river to 22 feet at mean low tide, which would be equivalent to 25 feet at high tide. When this work is done a great obstacle to the growth of the James river in commercial importance will have been removed. The mere recital of the advantages a location presents for a particular business will not, however, avail much in attracting the attention of those engaged in the business elsewhere, which, we take it, is one of the objects of the Richmond movement to which we refer. A shipbuilding plant already erected in the United States and in successful operation may be presumed to have established connections of a character not to be given up without compensatory advantages practically demonstrated. Possibly a shipbuilder may be attracted to the James from the Clyde, however, as the industry over there is now very severely depressed and a number of shipyards are idle. But the surest way to inaugurate the building of iron ships on the James would be for Richmond capitalists themselves to take hold of the matter and endeavor to "make it go." One successful shipyard on that stream would do more to attract others there than countless pages of glowing descriptions of local advantages.—*The Iron Age* of New York city.

Chesapeake & Ohio Ry., extensions.—In a recent number of the Richmond, Va., "State," we find the following interesting information:

"Notwithstanding the fact that railroad construction is almost at standstill now, the Huntington syndicate seems to have made arrangements to begin building at once between Nashville, Tenn., and Stanford, Ky., the latter point being situated on the Chesapeake and Ohio's Central road. The bonds necessary to raise money for the work were subscribed to last week, and the engineers and construction force will soon be employed in this important enterprise. The distance between Nashville and Stanford is 165 miles. This road will give the capital of Tenn. a new short line to the sea, and will greatly strengthen the Chesapeake & Ohio system.

And not only will the gap between Nashville and the Ky. Central be built at once, but, if we are correctly informed, the Huntington system will also build very soon, a road between Nashville and Memphis—150 miles—thus giving Memphis a new and direct route to Newport News. The distance between Memphis and the sea by the Chesapeake & Ohio and the Chesapeake, Ohio & Southwestern, *via* Louisville and Paducah, is 1,122 miles; whereas, by the projected routes just described (*via* Stanford and Nashville) the distance will be only 987—a saving of 135 miles Huntington's road between Memphis and New Orleans, 452 miles, is about completed, and as this strikes the Southern Pacific, Huntington's new trans-continental line is an accomplished fact. But in two or three years the capitalists controling this vast system expect to shorten the distance from various traffic centres by filling up gaps here and there.

The Chesapeake & Ohio Ry., and the Ky., Central RR., which form a part of the trans-continental system, together comprise 917 miles. They are under one management, whose headquarters are in Richmond. And in a year or two, when the Nashville branch is finished, it is more than probable that the Huntington lines east of the Mississippi will be managed by the Chesapeake & Ohio officials in this city. This fact alone will give Richmond a standing in the railroad world of which she may well be proud. It is hoped that our business men will have the enterprise and capital to profit by the great advantages which this system of roads secures them. There is every reason why Richmond should in a few years become one of the largest and wealthiest commercial centres in the United States."

The Mineral Resources of the Virginias at New Orleans.—Elsewhere we state that Prof. Fred. P. Dewey of the National Museum is now engaged on the line of the Chesapeake & Ohio Ry. collecting ores, etc., to illustrate the mineral resources of the Virginias at the New Orleans exhibition; we have since learned more of what his collections will embrace, as follows:

1. *Coals* of the Carboniferous and Secondary periods and any cokes made from them. Most of the specimens collected will be blocks 4 by 6 inches in size; but representative large specimens, from leading mines, to show the character of the coal beds will also be taken.

2. *Iron ores and iron products.* Of the ores full suites will be taken, roasted as well as crude, and of the fluxes and fuels used. Of pig iron sections of each number, made by breaking a pig and then cuting off an inch of thickness, taking care to preserve the fracture intact, with specimens of the slag made at the same time the pig was.

Ore and slag specimens for exhibition to be 4"x 4" or 6"x 6". Specimens of flue-dust, peculiar slags, cadmia, &c., are also wanted; photographic views of furnaces and mines; the time required for a charge to go through a furnace; copies of all analyses and tests that have been made; information as to runing of furnace, etc.

3. *Manganese ores*, specimens same size, etc., as iron ores.
4. *Zinc and lead ores* and their products.
5. *Gold* in its various forms as quartz, placer, sulphurets, etc.; the results of processes of working, etc.
6. *Tin and copper ores* and their products.
7. *Pyrites* used in the manufacture of sulphuric acid, etc.
8. *Polishing powders*, infusorial earth, etc.
9. *Ochres* of various kinds.

All specimens should be fully labeled, giving locality so it can be readily identified.

This Virginia collection will be exhibited by itself at New Orleans, though as part of the National Museum exhibit, and will be accompanied by a large map of the state on which will be indicated the locality from which each specimen was collected, thus adding largely to the value of the exhibit.

The value of cut Mica.—Messrs. Richard Baker & Co., 9 Mincing Lane, London, Eng., send us the following particulars of a consignment of 120 pounds of North Carolina mica, shiped to them from New York, with the prices realized in London. The quality was not uniform, containing a large number of inferior sheets, as also incorrect measurements.

No	Pounds.	Size, inches.	s. d.	£. s. d.
1	6	6 by 8	19. 6	5. 17. 0
2	3	6 " 10	19. 6	2. 18. 6
3	2	7 " 10	19. 6	1. 19. 0
4	7	7 " 8	19. 6	6. 16. 6
5	4	6 " 7	19. 6	3. 18. 0
6	6	5 " 8	19. 0	5. 14. 0
7	3	4½ " 6½	17. 6	2. 12. 6
8	4	4½ " 7	17. 6	3. 10. 0
9	4	4 " 7	16. 6	3. 6. 0
10	4	4 " 6½	16. 6	3. 6. 0
11	11	4½ " 5½	16. 6	9. 1. 6
12	4	4 " 6	16. 6	3. 6. 0
13	4	4 " 5	14. 0	2. 16. 0
14	1	6 " 11	19. 6	19. 6
15	3	9½ " 13	19. 6	2. 18. 6
16	4	5 " 7	18. 6	3. 14. 0
17	4	4 " 9	17. 6	3. 10. 0
18	4	4½ " 6	17. 0	3. 8. 0
19	4	5 " 6	18. 0	3. 12. 0
20	2	5 " 9	19. 6	1. 19. 0
21	4	4 " 8	17. 6	3. 10. 0
22	4	4½ " 4½	14. 0	2. 16. 0
23	4	5 " 6½	18. 6	3. 14. 0
24	6	4½ " 5	14. 0	4. 4. 0
25	4	6 " 9	19. 6	3. 18. 0
26	4	7 " 7	19. 6	3. 18. 0
27	4	7 " 9	19. 6	3. 18. 0
28	3	5 " 10	19. 6	2. 18. 6
29	2	5½ " 9	19. 6	1. 19. 0
30	1	6½ " 8	19. 6	19. 6

We publish the above to call the attention of our Midland, Piedmont, and Blue Ridge dwelling people, where mica is a common mineral, to its value when of good size and quality.

Precious stones in demand.—Messrs. Richard Baker & Co., of London, Eng., advertisers in *The Virginias*, send us the following descriptions of precious stones which they deal in:

Topaz.—A mineral ranked by mineralogists amongst gems, and the finer varieties of which are much valued, both for their lustre and the beauty of their color. Fine topazes are found in Ceylon, but those most prized by jewelers are generally from Brazil. The finer varieties of topaz are in general found either crystalized, or as small rolled masses, which may have been formed from crystals in alluvial soil. Topaz is either colorless or red, blue, green or yellow, in great variety of shades; its crystals are rhombic prisms, generally terminated by four-sided pyramids, but often variously beveled and acuminated.

The specific gravity is about 3.5, the lustre is vitreous. Topaz is translucent or almost transparent on the edges, it is harder than quartz; it is rendered very electric by heat or friction, and by this property a topaz may at once be distinguished from a diamond or ruby, for which otherwise when cut and set, it might readily be mistaken.

Chrysolite.—A mineral of a fine green color, with vitreous lustre, transparent and having double refraction, in hardness about equal to quartz; it often crystalizes in four or six-sided prisms variously modified.

Very fine specimens are brought from Egypt and other parts of the East, also from Brazil. Chrysolite is used by jewelers as an ornamental stone, but is not highly valued. The Chrysoberyl is sometimes called chrysolite by jewelers.

Ruby.—A gem much prized and only inferior to the diamond or perhaps also to the sapphire. It is regarded by mineralogists not as a distinct species, but as a mere red-colored variety of sapphire. The finest Red rubies are generally known as Oriental rubies, and are indeed brought from the East, chiefly from Ceylon and the Burman empire. The best generally comes from the neighborhood of Syriam in Pegu. In Ceylon rubies are found in remarkable abundance. Sir Alexander Burns describes a ruby mine at Badakshan in Bactria.

Sapphire.—A gem exceled in value by no precious stone except the diamond, and regarded as a variety of corundum; it is highly transparent and brilliant, and sometimes colorless, the colorless kind is sometimes sold as diamond, it more frequently exhibits color, generally a bright red or beautiful blue, more rarely gray, white or green. The red variety is the Oriental ruby of lapidaries, the blue is that commonly called sapphire.

It is found crystalized usually in six-sided prisms, terminated by six-sided pyramids, and is sometimes embeded in gneiss, but it more frequently occurs in alluvial soils. Ceylon is noted both for its rubies and sapphires, the latter being the more abundant; they occur with garnets and other minerals in a stratum of water-worn pebbles firmly embeded in clay, in which there are occasional lumps of granite and gneiss.

Garnet.—A precious stone, some of the varieties of which are of great beauty. Garnets are found most generally in mica-slate, hornblende slate and gneiss, less frequently in granite and granular limestone, sometime in serpentine and lava.

The color is various, generally some shades of red, brown, black, green and yellow, colorless or white specimens also occur.

Noble or Precious garnet also called Almandine, is generally of a crimson red color, sometimes of so deep a tint that jewelers hollow it out beneath or place at the back of it a plate of silver. When transparent it is called Precious garnet, and, if not so, Common garnet.

The finest garnets are imported from Syriam in Pegu; a Syriam garnet of a velvety black color, without defect, is valued at about half the price of blue sapphire of the same weight.

The large specimens of the Precious garnet are generally engraved with figures, and thus acquire a very high value.

A variety of garnet known as Grossularite from its resemblance in form, size and color to a green gooseberry, is brought from Siberia; Cinnamon stone is a variety of garnet.

Common garnets unsuitable for gems are abundant and often powdered, and used for polishing and cuting other stones, this powder is known to lapidaries as Red emery.

Heliotrope or Bloodstone.—A variety of Chalcedony or of Jasper, of a green color with red spots. The finest heliotropes consist of Chalcedony, and are translucent, at least at the edges; the Jasper bloodstones are opaque.

The finest specimens of this mineral are bronght from the southern part of Asia. It is much used for boxes, seals etc., and those specimens are most valued in which the ground color is beautiful, and the spots bright and well distributed.

Buckingham, Va., Slate.—The editor of the "Religious Herald," of Richmond, Va., who recently visited the noted slate quarries of Messrs John and Evan Williams near New Canton, Buckingham county, says these gentlemen who purchased these immense quarries a few years ago have met with great success in working them, and that they are now engaged in constructing a railway to New Canton to connect their quarries with the Richmond & Alleghany RR., and that in addition to their extensive manufacture of roofing and other slates they have recently begun to make, on a large scale, slate mantles, hearths and ornamental work of various kinds. These gentlemen are from Wales and they employ a large number of skilled Welshmen in their quarries and works.

For Birch, Beech and Maple lumber for about three years past there has been a growing demand for factory flooring, instead of the pitch or southern pine formerly in use. There is now a very fair demand for birch, beech and maple lumber, and a number of large mills have used it in preference to southern pine. This lumber is claimed to be more durable than southern pine, and will not sliver as that wood does when worn. It is also cheaper. A considerable demand for this hard-wood lumber for flooring in roller skating-rinks has also sprung up within the last two or three years. With the use of this flooring in skating-rinks there has also arisen a considerable demand for it for dining rooms and hall ways, where it has to a great extent displaced ash, chestnut and walnut, being from one-quarter to one-half less in price, and, it is claimed, being fully as durable. It is being used somewhat also in public buildings. This hard-wood lumber is obtained mainly from New Hampshire,where there are large forests of these woods. There is considerable obtained also in Vermont. Up to its use for flooring, this class of timber was held to be of very little value, and its main use was in the manufacture of clothes-pines, pails, hay-rakes and a number of such miscellaneous articles. The timber lands on which it grew were valued mainly for their spruce and hemlock. The growing demand for hard-woods, however, has caused a considerable increase in the value of such lands. About all the mills in that section now have suitable facilities for the sawing, dressing and kiln drying of this lumber, while up to a few years ago very few of them touched it. Of the three varieties maple is the best, but is not so plenty as the birch and beech, and in large lots they are sold together. The growth of the trade in this lumber has changed the almost waste lands of northern New England into wood-lands of importance.—*Boston Commercial Bulletin.*

The Ocean's Wealth.—Prof. Huxley in the address which he delivered at the International Fisheries Exhibition, said: An acre of good ocean fishing ground will yield more food in a week than an acre of the best land will in a year. Still more vivid was his picture of the moving "mountain of cod," 120 to 130 feet in height, which for two months in every year moves westward and southward past the Norwegian coast. Every square mile of this colossal column of fish contains 120,000 000 fish, consuming every week, when on short rations, no fewer than 840,000,000 herrings. The whole catch of the Norwegian fisheries never exceeds in a year more than a square mile of this "cod mountain" and one week's supply of the herrings needed to keep that area of cod from starving. London might be victualed with herrings for a year on a day's consumption of the countless shoals of uncaught cod.

What the colors of Buoys mean.—When you enter any harbor in the world, said a pilot to a Sun reporter, where the channel is marked by buoys, you will find that those on your right as you pass in are painted red, and those on your left black. If you should see one painted in red and black horizontal bands, the ship should run as close to it as possible, because that indicates the centre of a narrow channel. Buoys with red and black vertical stripes always mark the ends of spits and the outer and inner ends of extensive reefs, where there is a channel on each side. When red and black checkers are painted on a buoy, it marks either a rock in the open sea or an obstruction in the harbor of small extent with a channel all around. If there are two such obstructions and a channel between them, the buoy on the right of you will have red and white checkers, and the one on your left will have black and white checkers When a wreck obstructs the channel a green buoy will be placed on the sea side of the wreck, with the word 'wreck' plainly painted on it in white letters, provided there is a clear channel all around it; otherwise, an even number will be painted in white above the word 'wreck' when the buoy is on the right side of the channel, and an odd number if the buoy is on the left.

United States Postage Stamps.—Benjamin Franklin's picture is finely engraved on the one-cent stamp in imperial ultra-marine blue. Andrew Jackson's head is on the old two-cent stamp in vermilion, after a bust by Hiram Powers. The picture of the Father of our Country is on the three-cent stamp in a beautiful green. Zachary Taylor makes his appearance on the old five-cent stamp in blue Lincoln's profile is on the six-cent stamp in red, from a bust by Volk. The seven-cent stamp gives the head of Stanton in vermilion, from a photograph (the photograph was taken from a bust). Thomas Jefferson's picture is on the ten-cent stamp in chocolate, also by Hiram Powers. The twelve-cent has the portrait of Henry Clay in neutral purple. Webster's fine old head is on the fifteen-cent in orange. The twenty-four-cent stamp bears the head of Gen. Scott in purple. Hamilton's picture is in black on the thirty-cent stamp.

Commodore Oliver H. Perry's portrait is well done on the ninety-cent in carmine, from Wolcott's statue. The new two-cent stamp is Washington's head in red. The four is Jackson's head in green, very near the same as the old two. Garfield's picture is on the new five-cent in brown; his picture is the only one with a coat on, which shows it was not taken somehow or other from a bust. Some of the old-time stamps had, instead of profiles, cars, steamships, horses, soldiers, and buildings. Each of the departments have stamps of their own; the denominations are the same as the postage stamps that I have been describing. Each department has only one color.

The Treasury, War, Interior, Postoffice, Justice, State, Agricultural, Navy, and Executive, have their own stamps. Some stamps are perforated, some unperforated, and some "rouleted," which is stamped dashes like ticket coupons.

The United States has had local and periodical stamps, but which, with the seven, twelve, and twenty-four-cent, have gone out of use—that is, out of general use. Stamps were first used in this country in 1847; there were then only two denominations They have been changed, and additions made six or seven times since then.

Local stamps were first used in 1844. There are seven "due stamps," or unpaid letter, as they are sometimes called; they have only been in use since 1879. Stamped envelopes were first used in 1853; they have been changed also. It has been said that a local stamp issued in Brattleboro, Vt., has a premium of $100, but I do not know whether or not it is true. All Confederate stamps have Jefferson Davis' portrait. They have a larger premium when used or canceled, than when unused.

The conditions in which Mica is found elsewhere are of interest to us in Virginia where beds of this valuable mineral ought to be found, under somewhat similar conditions, in paying quantities. We extract the following from descriptions of mica mines kindly sent us by Richard Baker & Co., of London, Eng.

Mr. W. C. Cumming, in a report on the Vein Mn. Mg. Co's mica deposits, east of Marion, N. C., says: "Made an open cut to strike the main vein or deposits: after runing in about 12′ solid formation was struck. The rock was irregular, and of a quartz felspar variety, thickly studed with crystals of Biotite or Black mica in small plates; this vein turned out to be an offset diping deeply into the mountain. I continued examination on same vein, by driving in a ditch, following the pitch of the vein about 25′ lower down the mountain, with the same unsatisfactory results, being unable to find the proper granitic formations, where large plates of mica are usually found.—Am of the opinion that good merchantable mica may be obtained when granitic or gneiss formations are reached.

S. E. by S. from Vein mountain, inspected a cuting already opened by negroes, and found there immense deposits of Black mica or Biotite, imbeded in a felspar quartz matrix, but the plates gnarled and so interlocked as to be separable only in very small crystals or plates, and of no marketable size.

In another portion of the Co's property, about 2 miles S. E. from Vein mountain, an open cut was driven in the mountain for about 15′ until hard felspar and quartz-felspar matrix was reached, this was also thickly studed with crystals of the Biotite or Black mica class, but in an undefined form, in small size, but of fair quantity."

Of the Black Hills mica mine near Custer City, Dakota, these statemeuts are made: "The ledge consists of a large body of hard, fine grained spar, in which blocks of mica are solidly embeded.

The vein is a fissure with a dip of about 25°, the wall-rock being all micaceous slate. Mica cropings appear on the surface of the main ledge for a distance of about 400.′ The spar body consists of a main ledge with several small ledges or rather series of ledges, something in form like the fingers to a hand, all coming together at the summit of the hill forming a large solid mass of spar and mica similar to a 'blow out.' The spurs or small ledges mostly seem to run together and form one vast ledge as depth is reached on the lower side of the hill. The upper or main ledge is from 10′ to 14′ wide, between walls of slate, carrying 3′ to 4′ of mica blocks, next the walls, the greater portion of the mica next the lower foot-wall. The other ledges or spurs vary in width from 3′ to 7.′ Mine has been worked about 14 months in all, the work having mostly been done on the surface by open cut. A shaft was sunk at one point on the main or upper ledge to a depth of about 35′, and a drift run from the bottom of the shaft along the ledge a distance of about 50′, showing good mica for that distance, the deepest point reached from the surface showing the best and cleanest mica. The surface workings extend for a distance of about 300′, at deepest points about 20 feet from surface. The mica produced is of good merchantable size, texture firm, color light, and reasonably clear; some of it, however, being a little cloudy, but upon being lightly heated this apparent defect soon passes away, when the mica is in appearance and texture equal to the best N. Carolina, Russian, or Norway.

The mica produced from this mine has cost, on an average, 60 cents a pound, mined and prepared ready for market. The mine, if worked in a good practical manner, would produce vast quantities of good size mica, and with good management could be made to produce from 2,000 to 4,000 pounds per month of good mica, at a cost of not to exceed 75 cents a pound laid down in Chicago. Total amount of money expended on mine to date about $9,000. Total amount of mica sold about 16,000 pounds, which at the present price list with 37 per cent off would amount to about $40,000. The mica has been put on the market throughout the Western states, large quantities of it having been handled by the Co-operative Stove Co., of Cleveland, Ohio, and by the Craigan Mfg. Co., of 145 Lake St., Chicago."

Of Revising the Tariff the Bulletin of the "Am. Iron & Steel Association" argues that we have had enough and concludes its substantial argument with these forcible questions:

"Why should there be? What class of our people is injured by the protective features of the present tariff? What consumer of any commodity is oppressed by the present duty on foreign articles? Are not the prices of all manufactured articles to-day cheap enough to satisfy the most exacting consumer? Are not metals, textiles, clothing, carpets, tools and implements of all kinds, and all other manufactured articles of prime necessity as cheap as any reasonable man should desire them to be—yes, many of them cheaper than they *ought* to be in justice to the labor that is engaged in producing them? If protection has cheapened all manufactured commodities by creating inexorable and merciless competition in their production in our country, why revise the tariff and reduce duties when the only result would be an increase in the importation of foreign goods and the consequent closing of many American factories and workshops? If, in brief, nobody but the foreigner and his American agent is injured by our tariff why should the American consumer complain of it? As a matter of fact he is not doing it. Only the professional free trade agitators are doing this. They are reckoning without their host. Six months or a year ago they made noise enough to cause some apprehension, but the scare is over, and today there is not in this country a more popular issue with the people of all classes than the protection of home industry and the preservation of the present tariff without serious alteration."

The International forestry Exhibition now in progress at Edinboro, Scotland, is likely to prove quite an advantage to the timber trade of the countries making exhibits there. The "N. Wn. Lumberman" says that one firm making an extensive exhibit of American oaks for railway car purposes has been making a series of tests showing the breaking strength of such oaks which will soon be published; also that a Mr. Penman, of Evansville, Ind., "has his memorandum book well filled with orders for white oak dimension stuff for the English and Scotch markets." It would be well for our lumbermen to take a hint from this for business and also to apply it by seeing that in all future exhibitions, and especially the ones at Louisville and New Orleans, exhibits are made of the superior timbers, both soft and hard woods, that abound in the Virginias.

Beechenbrook Foundry and Machine Works is a new industrial enterprise that Jolliffe & Estill have recently put in operation near Lexington, Va., using water-power.—This company will manufacture engines, boilers, castings of all kinds, machinery, etc. Lexington has excelent railway facilities and many advantages for the successful conduct of manufacturing enterprises.

Parkersburg, W. Va., has called for proposals for the construction of water works for that city.

The Industrial and Cotton Centennial Exposition that is to open at New Orleans on the first of next December, promises to surpass in novel and interesting features everything in the way of "World's fairs" that has yet been attempted. Thirty-two acres of floor room—more than all the floor room at the Philadelphia exposition and far more than all that of the London crystal palace—had been provided for, but it was soon found that all this large area was taken up in applications for space; it was then decided to add another building one-third the size of the first, making the available floor room fully 43 acres.

Provision has been made for exhibits of almost every kind that one can think of as desirable. There will be exhibits of machinery of all sorts, of manufactures, of agricultural and horticultural products, of farm stock of all kinds, of minerals and mineral products, of educational appliances, of railway rolling stock, etc., etc. To eyes from the temperate regions the centres of attraction will be the Mexican and Central American gardens with their wonderful growths of semi-tropical and tropical plants and trees, exhibits made possible by the climate of New Orleans. It is fortunate that this great industrial, scientific, and everyway educational exhibition is to take place and be prolonged through our winter, but the spring time of New Orleans, when so many can find opportunity to leave home long enough to study and derive the greatest benefit from this vast collection of objects of interest.—The great railways leading to New Orleans and those in charge of the exposition would do well to provide for monthly tickets, to include railway fares and board, as an inducement for many to go and make that much stay.

It is a matter of great importance to Virginia and West Virginia that they should be well represented at New Orleans in their *forest products*. We cannot enforce this better than by reproducing what the "Northwestern Lumberman," of Chicago, has to say in its issue of the 2d:—"Of particular interest to our readers are the provisions that will be made for the exhibition of woods and wood-working machinery. The South is awakening to a period of great commercial activity, and in looking to her natural resources, the immense and varied forests are seen to be among the most valuable. Not only do the lumbermen of the North recognize this fact, but the people of the South, generally, are alive to its importance, and are making efforts to render this natural wealth available. All the southern states will make exhaustive displays of their resources in this direction, showing its character, extent, and situation. The visitor will be able here to see just what the South has to offer in this line to capital. Not only this, but the people of the South will go to New Orleans to learn what they can from the exhibits of northern lumbermen and machinery manufacturers. They want to learn what machinery there is in the market, how saw mills are built and run, how to build and operate sash, door and blind factories, furniture factories and wood-making establishments of every character. They look upon this exposition as a college of the arts and sciences in which the world, but more particularly the Northern states furnish instructors. Here will be a rare opportunity for all who wish to open new fields to their capital and machinery. Not only will the South be there, but all the countries south of the Rio Grande will make exhibits of their wonderful natural resources, and show what the commerce of the United States with them should be.

Besides all these matters of the future, the immediate results to exhibitors are likely to be profitable. It is claimed that out of 600 car-loads of machinery sent from the eastern states to the Louisville exposition of 1883, only 100 were carried back. The result will probably be still more gratifying at New Orleans. The people of the South will go there not only as spectators and learners but as purchasers.

The exhibit of woods and forest products promises to be very large. A special department in the main building will be assigned to them, and each state will make a large and complete display.—There will be ample provision for the exhibition of machinery in operation. Machinery hall will be 1,375 feet long by 250 feet in width. The shafting and power required will be far in excess of that required in any previous exposition. In the building will be shown machinery in operation that does not make a disagreeable amount of dust or dirt, aud outside in a special part of the grounds will be located machinery that cannot be shown in the main building. Such exhibits will include brick and tile machinery, saw mills and wood-working machinery. Never before has there been such an opportunity to make a practical working display of saw mills, etc. A storage boom will be provided in the river at one point on the grounds and rafts of logs will be brought down in sufficient quantities to enable each exhibitor to run his mill for a short time each day. Already arrangements have been made for ten exhibits in this class.

According to the elassification of exhibits issued by the management, the following are the heads in class 302, which is devoted to woods: Specimens of different kinds of forest trees; wood for cabinet work, for fire-wood and for building; timber for ship-building, staves, cleft timber, shingles, cork; bark for textile purposes; taning, coloring, odoriferous and resinous woods; products obtained from forests; charcoal and dried wood, raw potash, turning, basket work, etc. In class 605 are put machines and apparatus in general, which include steam engines, boilers, gauges, etc. Under class 606 are placed machine tools, including all kinds of wood-working machinery.

In regard to the forestry departments of the state collections it is recommended that specimens be prepared as follows:

A. Logs cut from the trunk of the tree one foot above the ground, and four feet long. At the upper end they are sawed longitudinally through the heart 15 inches, and the blocks thus formed removed upon one side by a cut slightly beveled The sawed surfaces are then planed and sandpapered. Give in catalogue the diameter of these blocks at the upper end, that is five feet from the ground. Of trees too large to be thus handled, cut a disc one and a half foot thick five feet from the ground.

B. Planks two inches thick and two feet long, cut from bark to bark through the heart, or in case of very large trees from heart to bark, should be well seasoned, dressed, sandpapered, and polished, by rubing with a solution of white shellac and alcohol until a glossy but colorless surface is obtained.

C. Knots and curls for veneers, ornamental woods, turned and carved specimens, varnished specimens to show their appearance in furniture, will form another c'ass.

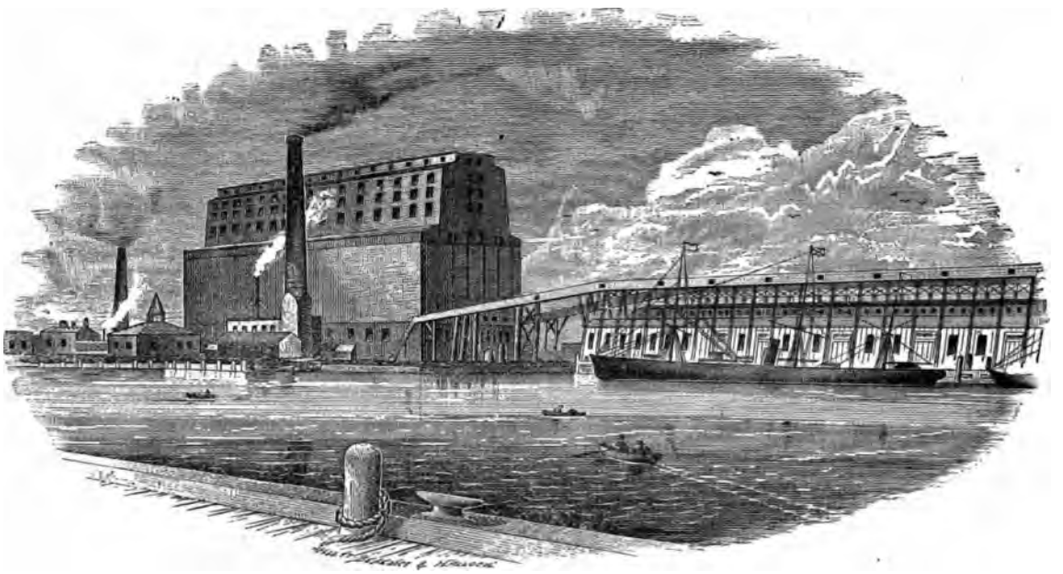
D. Spoke handle, rim, bucket and barrel timber, hoops, and every kind of half-manufactured wood form another class.

E. Forest products, barks, medicinal, and for taning, wild fruits, resin and gums, medicinal herbs and roots, form another class.

Norfolk & Western RR. in its monthly statement of earnings and expenses shows that its net earnings in June, 1884, were $57,254, against $84,079 in June, 1883; a decrease of $26,825, or 32 per cent. The statement adds: "The decrease of gross earnings in June, 1884, is due to the prevailing low rates, to the falling off in all through business, and to the interruption of the movement of iron ore and pig iron caused by the temporary shuting down of furnaces for repairs subsequent to the Pocahontas mine explosion.

Current business is impeded by the indisposition of shipers to move the large crops of the present year during the prevalence of the low prices incident to a period of financial depression."

For the first half of 1884 its net earnings were $458,749, against $501,936 for first half of 1883; a decrease of $43,187, or but 9 per cent.



Chesapeake & Ohio Grain Elevator at Newport News, Va.

We find the following interesting article in the "American Elevator & Grain Trade," one of the great and ably conducted industrial journals for which the city of Chicago, Ill., is becoming so noted.—We are under obligations to its courteous proprietors, Mitchell Bros. Co., for the use of the excelent cut that accompanies the article. This elevator was completed and began to be used the last of July, 1884.

"The Chesapeake and Ohio Grain Elevator, an illustration of which we present to our readers on this page, is located at Newport News, Va., and largely gives to this place its commercial importance as a shiping and transfer port. It is a striking feature in the history of that point, greatly contributing to its substantial progress, drawing to it and expanding one of the principal commercial interests of our country—the grain trade—and in this respect placing Newport News in the front rank. Other industries will be brought to cluster around it, and it will doubtless become an important manufacturing and railway center.

The gentlemen who compose this company are financially among the leading commercial citizens of New York city, fully endowed with the spirit of enterprise and energy of that great metropolis. Capt. S. R. Kirby, of New York, is their chief engineer and designer, a man of well established reputation and well acquainted with the great improvements that have been made in marine and elevator construction during the last twenty years.

The elevator is located at the southwest corner of the peninsula between the Chesapeake bay and the James river, and at the southeastern terminus of the Chesapeake & Ohio Railway, near Hampton, Fortress Monroe and Hampton Roads, Va., a familiar locality as associated with our civil war. The elevator's harborage is on the James river, with its ends toward a large railroad and vessel pier, 150 feet wide and 700 feet long, on top of which are built two large double-belt conveyors, one on each side, having two runs of belts each, permiting the loading of two vessels at the same time. The vessels are unloaded on either side of the pier; thence into cars on two tracks, in the center of the pier, to be taken west over the Chesapeake & Ohio Railway. While the vessels are being unloaded from their sides, they may be also loaded up with grain by means of the above mentioned belt conveyors on the pier. A marine elevator, on one side of the pier, elevates to the belt conveyors carrying from the canal boats and small vessels to the elevator large quantities of grain gathered up along the banks of the James and other rivers.

The elevator is 90 feet wide, 386 feet long, 164 feet high, with engine and boiler rooms, 40 x 100 feet and 40 feet high. There were used in its construction, etc., 3,000 piles, 100,000 feet of white oak timber, 82,000 cubic feet of stone, 800,000 brick, 6,000,000 feet of pine and spruce lumber, 4,500 kegs of nails, six large boilers, two large engines, 200 tons of machinery, 20 large hopper scales, 17,200 feet of rubber belts, in sizes varying from eight to forty-eight inches in width, and from fifty to 1,700 feet in length; and besides there were 8,000 elevator buckets, and innumerable lots of other material used in building such structures.

The storage capacity of the house is 1,600,000 bushels, with a receiving capacity of 60,000, and a shiping capacity of 40,000 bushels per hour. It is complete in all its details, and built as nearly fire-proof as it is possible to make such a building. It is excelently arranged for the cheap handling of grain. Water pipes are carried and automatically operated throughout the building, through which a constant stream of water is runing, supplied by the company's large water works, near the building.

The work of construction was done, under contract, by J. A. McLennan, of Chicago, Ill,, a prominent and practical architect and elevator builder, who has designed and built, within the last four years, fifteen of the largest and most improved grain elevators in the country. The lumber came mostly from Maine, Georgia and Virginia; the stone from New York and Virginia; the brick from Richmond, Va.; nails from New York city; boilers and engines from Stern's Mfg. Co., of Erie, Pa.; the buckets from the Webster & Comstock Mfg. Co., of Chicago, Ill. The scales were from Fairbanks & Co.; belts from the New York Rubber Belting and Packing Co., of New York city; and the machinery, including elevator tanks, boots and heads, line shafting, hopper castings, spouts and valves, horizontal conveying machinery, triping machines, rollers, tighteners, etc., from Poole & Hunt, Baltimore, Md. The latter are practical engineers and machinists, holding their position among the noted leaders of their profession in this country,as the character of their work attests."

Acts of General Assembly of Virginia, Sess. 1883-4, relating to Companies.

(Continued from page 110.)

2. Acts relating to other Companies.

1. The James River Valley Agricultural Fair of Scottsville, Va., was incorporated.—p. 72.

2. The Natural Bridge Forest Co. was incorporated to hold the Natural Bridge and not over 3000 acres of surrounding land, to lay out the same in parks and lawns, to lease property for hotels, etc., and to construct railroads from the Natural Bridge to convenient points on the Shenandoah Valley, the Richmond & Alleghany, or the Valley railways.—p. 749.

3. Alleghany Elevator Co. was incorporated to construct at Richmond or other points in Virginia, warehouses, elevators, conveyors, etc., and to hold property of any description its business may require.—p. 474.

4. Petersburg Gas Light Co. had its charter amended so as to allow it to operate in the city of Petersburg and in the counties of Prince George, Chesterfield and Dinwiddie.—p. 476.

5. Farmville Lumber Co was incorporated to conduct a lumbering business at Farmville and with authority to improve Appomattox river from Farmville through Prince Edward, Cumberland, Buckingham and Appomattox counties.—p. 485.

6. Virginia Warehouse & Transportation Co., incorporated to construct warehouses, elevators, etc., at or near Norfolk, Va —p. 496.

7. Virginia Nail and Iron Works Co., incorporated to manufacture iron rails, nails, etc; to build furnaces, mine, etc., at or near Lynchburg, Va.—p. 501.

8. Montgomery & Floyd Mining & Manufacturing Co., incorporated to manufacture, mine, etc., as any other company may, and with power to connect its operations with Norfolk & Western RR by railways.—p. 513.

9. A Department of Agriculture, Mining and Manufacturing for Virginia, was chartered, in charge of the Commissioner of Agriculture.—p. 528.

10. Walker's Creek Toll-Bridge Co. chartered to construct a bridge across Big Walker creek, near Shannon's, Giles county, Va.—p. 548.

11. Strasburg Stone and Earthenware Manufacturing Co. incorporated to manufacture earthen, stone and other wares, tiles, etc., at Strasburg, Va.—p. 549.

12. Lewis Spring Manufacturing and Supply Co., incorporated to manufacture railway and steamboat supplies, machinery, etc., near Portsmouth, Va.—p. 637.

13.—United States Fishery Co. incorporated to catch, purchase and cure fish, especially shell fish, at suitable places along the Atlantic, Pacific and Gulf coasts, and in the inland waters of the Southern states, with principal office at Norfolk, Va.—p. 643.

14. Holston Springs Co. incorporated to mine, manufacture, build railways, etc. for its own use ; with chief office at Holston Springs, Va.—p. 647.

15. Wythe Iron Co. incorporated to hold real estate, not to exceed 30,000 acres in any one county, in Pulaski, Bland, Wythe, Smyth, Grayson and Carroll counties ; to mine ores, to manufacture iron, steel, etc.—p. 650.

16. Pulaski Iron Co. incorporated to hold real estate, not to exceed 30,000 acres in any one county, in Wythe, Carroll, Smyth, Bland, Pulaski and Grayson counties ; to mine ores, to manufacture iron, steel, etc.—p. 655.

17. Farmers' Warehouse Co. incorporated to build at Blacks and Whites, Nottoway county, Va., warehouses for the storage, safe-keeping and sale of farm products.—p. 660.

18. New River Steel & Iron Co. incorporated to mine, manufacture, etc., iron, coal and other minerals and materials.—p. 664.

19. Iron Mountain Co., incorporated to hold real estate, not to exceed 25,000 acres in any one county, in Wythe, Smyth, Carroll, Grayson, Rockbridge, Botetourt and Augusta counties, and to mine ores manufacture iron, steel, copper, zinc, lead, etc —675.

20. Virginia Beach Canal Co incorporated to construct a canal between Lynnhaven river or Lynnhaven bay and Back bay, in Princess Anne county.—p. 690.

21. Cripple Creek Iron & Manufacturing Co. incorporated to hold not exceeding 30,000 acres of land in any one county, in the counties of Pulaski, Bland, Wythe, Smyth, Grayson and Carroll ; to mine ores, manufacture iron, steel, etc.—p. 714.

22. New River Zinc & Iron Co. incorporated to hold real estate not to exceed 30,000 acres in any one county, in Wythe, Carroll, Smyth, Bland, Pulaski and Grayson counties, to mine ores, manufacture iron, steel, etc.—p. 716.

23. Builders Exchange of Richmond, incorporated to regulate business upon just and equitable principles in Richmond, Va.—p. 724.

24. Stock Creek Coal & Iron Co. incorporated to hold real and personal estate, construct improvements of any kind, build railways, quarry, mine and manufacture iron and other ores, etc.—p. 726.

25. Banner Co. incorporated to do a publishing business. —p. 9.

26. City Gas Light Co. of Norfolk, charter extended, renewed and amended.—p. 17.

27. Chesapeake Warehouse Co. of Norfolk, charter amended to increase capital stock.—p. 19.

28. London & Buckingham Construction and Mining Co. had its name changed to Flat-Top Coal Co.—p. 28.

29. Southwest Virginia Improvement Co. charter amended to allow annual meeting of stockholders at any place in Va.—p. 51.

30. Loudoun Live Stock Insurance Co. incorporated to insure live stock —p. 66.

31. Richmond Union Depot Co. incorporated to build a union depot in the city of Richmond, Va.—p. 68.

32. Bristow Brown Stone Co. incorporated to hold real estate, mine and manufacture brown stone, or other stones and minerals.—p. 69

33 Norfolk Terminal Co. authorized to construct at Norfolk, Va., wharves, warehouses, etc., and to conduct a transportation business by steamships or railways.—p. 71.

34. Air Line Turnpike & Draw Bridge Co. incorporated to construct a turnpike from Portsmouth to Shoulder's hill, crossing Western branch of Elizabeth river by a draw bridge.—p. 14.

35. Progressive Age Publishing Co. incorporated to publish a newspaper, etc., at Estillville.—p. 122.

36. The act regulating joint stock companies amended.—p. 129.

37. Norfolk Classified Building Association incorporated to carry on a building association business. -p. 136.

38. Portsmouth Gas Co's charter amended, allowing it to extend its operations into Norfolk county.—p. 169.

39. The act imposing taxes prohibits the payment of taxes in Va. coupons by corporations.—p. 229.

40. John L. Roper Lumber Co. incorporated to conduct a general lumber business, etc., and to construct such rail- or tram-ways as are necessary.—p. 233.

41. Old Dominion Iron & Nail Works Co., authorized to purchase timber lands in Chesterfield, Amelia, Rockbridge, Powhatan and Botetourt counties.—p. 236.

42. West Point & Aylett's Turnpike Co. incorporated to

build a turnpike from West Point, in King William county to Aylett's in the same county.—p. 283.

43. Virginia Normal School, Rockingham county, Va., incorporated.—p. 286.

44. Liberty Improvement Co. incorporated and authorized to acquire real and personal estate, build houses, etc., in Bedford county, Va.—p. 300.

45. Shenandoah Iron, Lumber, Mining & Mfg. Co., charter amended, so it can hold land, not to exceed 100,000 acres, in Page, Shenandoah and Warren counties and elsewhere in the state; name changed to Shenandoah Iron Co.—p. 304.

46. Anglo-American Sulphur & Copper Co. incorporated to carry on a general mining and smelting of ores business in Southwestern Va.—p. 307.

47. Craig Co., incorporated to hold real estate in Craig and adjoining counties, to dig, mine and manufacture iron, coal, marble, etc.; and to construct railways from some point on Craig creek to the Richmond & Alleghany RR. in Botetourt county, and to the Norfolk & Western RR. in Giles or Pulaski counties.—p. 341.

48. Tagus Mill & Mining Co., charter amended.—p. 349.

49. Nelson Mfg. Co., incorporated, may hold real estate, conduct woolen or other factories, and engage in any other business an individual may lawfully carry on —p 349.

50 Odd Fellows Building Association of Norfolk, charter amended.—p. 353.

51. Franklin Agricultural & Mechanical Society, incorporated to establish and conduct fairs, etc.—p. 354.

52. Portsmouth & Norfolk Building and Loan Association, incorporated to accumulate capital and make loans on real and household property.—p. 359.

53 Union Manufacturing & Milling Co., incorporated for the purpose of milling and manufacturing in Fluvanna county, Va.—p. 360.

54. Dismal Swamp Canal Co., repealing section four of incorporating act.—p. 368.

55 Nansemond & Isle of Wight Drawbridge Co., charter amended.—p. 371.

56. Norfolk & Princess Anne Turnpike Co., to consolidate with the Broad creek and London Bridge Turnpike Co. —p. 377.

57. Nelson Improvement Co. incorporated to construct telephone lines in Nelson county, to buy live stock, own cattle yards, etc., and engage in agricultural, commercial or trading business.—p. 383.

58. Alien Mining Co's., required to register their charters. —p. 385.

59. Balcony Falls Co., incorporated to mine or manufacture any ores, materials or products of this state in Rockbridge, Amherst, Bedford and Botetourt counties.—p. 386.

60. Loudoun County Live Stock Exhibition Association, incorporated to hold an annual exhibition of live stock.—p. 409.

61. State Female Normal School, charter establishing a state female normal school at Farmville, Prince Edward Co., Va., p. 417.

62. Northern Neck News Co., incorporated to publish a newspaper, etc.—p. 418.

63. National Compress Association of Norfolk, incorporated to compress and warehouse hay, cotton, etc.—p. 446.

64. Norfolk Storage Co., charter amended enlarging its powers.—p 452.

65. Electric Co of Virginia, incorporated to furnish the electric current for all purposes, etc.—p. 470

66. Dunbar Furnace Co. of Pa., incorporated to hold real estate in Virginia.—p. 472.

67. White Oak Loan & Building Association of Halifax, incorporated to aid in building houses by loans, etc.—p. 680.

68. Iron & Steel Works Association of Virginia, certain privileges confered.—p. 681.

69. Upper Appomattox Co., authorizing the city of Peersburg to purchase all of its stock.—p. 750.

3. Banks incorporated.

1. Exchange & Deposit Bank of Abingdon, Va.—p. 6.
2. Bank of Heathsville, Va.—p. 357.
3. Farmers' Bank of Sussex county.—p. 361.
4. Bank of Goodson, Va.—p. 558.
5. Nelson Savings Bank, of Nelson C. H., Va.—p. 375.
6. The tax bill provides that no tax shall be assessed on the capital of banks, but the shares of stockholders shall be assessed and taxed at their market value.—p. 568.

Details of cost of a ton of pig iron, etc., in Pa.—From a comparative statement of the cost of manufacturing a ton of pig iron and of converting the same into ingots and of manufacturing a ton of steel blooms and a ton of steel rails in Pa. and Colorado, published in "Eng. & Mining Journal," we extract the following details of cost in Pa., from a month's operations in 1883:

Cost to produce a ton of pig iron.

Fuel, coke (coke cost $3.45 at works)	$ 4.33
Limestone	.33
Ore, scrap, etc	11.35
Labor, repairs, etc	3.42
Incidentals, lubricants, sand, clay and general expenses	....
	$19.43

Cost to convert pig iron into ingots.

Fuel	$ .58
Lubricants	.03
Tools, incidentals and oils	....
Limestones	.02
Refractories	.29
Repairs 27; Repairs and improvements; General repairs 22	.49
Labor and pay rolls	1.27
General expenses	.11
Iron, including spiegel	26.47
	$29.26

Cost to make steel blooms.

Fuel	$ .29
Lubricants	.02
Oils, tools, and incidentals	.....
Refractories	.01
Shortage 1883, per inventory	.....
Regular repairs	.28
Extra repairs	.25
Labor and office expenses	.85
Ingots used	30.23
General expenses	....
	$31.93

Cost to make steel rails.

Fuel	.41
Lubricants	.05
Oils, tools and incidentals	....
General repairs, Repairs and	.39
Extra repairs, improvements,	.33
Labor, salaries, etc, labor	2.12
Blooms used	33.11
Delivery nnd general expenses	.....
Total expenses	$36.41

Stuart, is the new name of Patrick C. H., or Taylorsville, in honor of the famous confederate calvary leader, General J. E. B. Stuart, who was a native of Patrick, one of the picturesque Piedmont counties of Virginia. This village has just been reached by the Danville & New River RR., and can now be easily visited. It is located on the southwestern slope of a spur of Bull mountain, one of the Coast or Piedmont range that boldly rises to an elevation of 3,188 feet above tide, while to the west of it a long raged spur, from the main Blue Ridge itself, pushes miles beyond the village to the southward. The railway station is on the bank of South Mayo river of the Dan, a point 1,188 feet above tide and about a half mile from the present village, which at the court-house is probably 100 feet higher, or only 100 feet less elevated than the C. & O. station in this city of Staunton.

It is but nine miles due south from Stuart to the N. C. line, and but a few miles northwest, by a well graded road, to the eastern crest of the Blue Ridge plateau and to some of the wildest and most romantic mountain scenery—that of the Meadows and Pinnacles of the Dan—we have ever looked upon. Here is a new and untroden field for the tourist. Let Maj. Sutherlin make it part of his paternal care for this region to have a good hotel on one of the hills at Stuart, with horses and vehicles to suit, and this vicinity will become one of the most attractive regions of Virginia. It is in a land now "flowing with milk and honey."

The Danville & New River RR. was opened to Patrick C. H. (Taylorsville), a distance of 75 miles from Danville, the 29th of July, 1884. This completes this narrow-gauge railway from Danville to near the eastern foot of the Blue Ridge and about half way to the Norfolk & Western RR. at some point between its New River Bridge and Wytheville stations, provided the extension of this road takes that direction. Both in its construction and the business it has done this road, thanks to the energy and sagacity of its president, Maj. W. T. Sutherlin, has been a great success. It has opened a fine country, one rich in varied resources, to a fuller development.

The Danville, Va., "Register" says: "This road runs through an attractive, productive and beautiful section of Pittsylvania, Henry and Patrick counties. For miles it winds along the fertile valley of the Dan, shoots across Henry, strikes Smith river and pursues its tortuous way up its banks, and in its course follows several mountain streams. Some of the scenes that suddenly burst upon the view are exceedingly lovely. A short distance this side of Patrick Springs the train shot into a pretty valley; Bull mountain looms majestically on the right and for miles, almost under the shadow of the mountain, did it glide towards Stuart.

Stuart is a town on a hill, about a half mile from the location of the depot. Its elevated position puts it in command of several fine views and charming landscapes."

Short-hand writing was taught in the U. S., in 1882,—according to a very interesting circular of 160 pages, issued by the National Bureau of Education—in 276 schools, most of them devoted exclusively to teaching this art, though in some of these type-writing, telegraphy, penmanship, etc., were also taught. During that year 12,470 persons received instruction in short-hand, 10,197 in these schools and classes, to say nothing of the large number studying without a teacher. During 1883 there were 23 additional schools established, making 299 in operation in 1883. In the published list of this circular no short-hand schools are credited to Virginia or West Virginia, still these states have furnished some of the best stenographers in the country. Some of our technical schools should provide for teaching this useful art, one that adds greatly to the value of the services of anyone seeking clerical work.

The Population of Augusta Co., Va.—We have no enumeration of the population of this county prior to the 1st U. S. census, that of 1790, but from a table of the number of militia in the counties of Virginia in 1780, in Jefferson's "Notes on Virginia," using his method of ascertaining the total population from knowing the number of the militia, we make out that the population of this county, as now constituted, was about 5,500 white in 1780; at the same time there were probably 500 negroes, making the total population in 1780 about 6,000, or 6 to the square mile.

The following table gives the population of this county, by races and aggregates, at each U.S. census from 1790 to 1880, and the average number to a square mile at each census.

Census.	Whites.	Negroes.	Totals.	No. to sq. m.
1790	9,260	1,626	10,886	10.9
1800	9,671	2,041	11,712	11.7
1810	11,232	3,076	14,308	14.3
1820	12,963	3,779	16,742	16.7
1830	15,257	4,669	19,926	19.9
1840	15,072	4,556	19,628	19.6
1850	18,983	5,627	24,610	24.6
1860	21,547	6,202	27,749	27.7
1870	22,026	6,737	29,763	28.8
1880	26,393	9,310	35,710	35.7

These figures show that the county has had a slow but steady increase in population at each census except that of 1840; this increase has been more rapid since the county was reached by railways between 1850 and 1860. The gain in population from 1850 to 1860 was 12 per cent; from 1860 to 1870, the decade of the civil war, during which this county was the scene of active operations, the gain was but 3½ per cent; while from 1870 to 1880 it was over 12 per cent. The next census will show a still larger ratio of increase.

The large increase in the negro population between 1870 and 1880 was in consequence of the large demand for labor created by the construction of new railways, the opening of mines and the general development of the county.

It is proper to add that this county has furnished, from the date of its settlement, large numbers of emigrants to all the westward country; the highways of travel to the west have always led through it, and its sons, vigorous scions of a hardy and enterprising stock, have always been among the leading pioneers in the westward march of population.

The average density of the population of this county in 1880 was about the same as that of the states of Tennessee and Vermont. The population of the state of New York was three times as dense, that of Massachusetts 6 times and that of Rhode Island 8 times.—If there had been as many people to a square mile as there were in Rhode Island, this county would have contained 272,000 people in 1880.

The condition of the negro population of Augusta county at each U.S. census is shown in the following table:

Census.	Free.	Slave.	Census.	Free.	Slave.
1790	59	1,567	1840	421	4,135
1800	95	1,946	1850	574	5,053
1810	196	2,880	1860	586	5,616
1820	267	3,512	1870	6,737	.....
1830	404	4,265	1880	9,310	.....

The table preceding the above shows that the negro population of this county was very nearly stationary, or increasing but moderately, until between 1870 and 1880. In 1860 most of them slaves, they were a little over 22 per cent of the population; in 1870, when all free, they made about 23 per cent; and in 1880 they were about 26 per cent of the whole population.

The population of Augusta county in 1870 and 1880, by its seven civil divisions, the city of Staunton and six magisterial districts, is shown in the following table:

	1870.	1880.
1. Staunton city	5,120	6,664
2. Beverley Manor district	2,951	5,362
3. Middle River "	4,376	5,549
4. North River "	4,163	4,313
5. The Pastures "	3,292	3,991
6. Riverheads "	4,380	5,757
7. South River "	4,481	5,074

South River district includes Waynesboro, which had a population of 536 in 1870, and 484 in 1880.

The population of Augusta county in 1880 by sex and by school, military and voting ages, was as follows:

	All ages.	5 to 17.	18 to 44.	21+
Males	17,189	5,530	6,270	8,215
Females	18,521	5,558	.....	.....
	35,710	11,088	6,270	8,215

The school age, 5 to 17, includes both ages named, so also does the military age, 18 to 44. The voting age, 21, of course is 21 years and over.—Those of school age form nearly one-third of the population, those of military age nearly one-sixth, and the males of voting age over one-fourth.

The nativity of the people of Augusta county in 1870 and 1880, was as follows:

	1870.	1880.
Natives of U. S.	28,376	35,205
Foreign-born	387	505

The following table shows where the people living in this county in 1880 were born:

Virginia	33,976	British America	19
North Carolina	76	England and Wales	106
Maryland	239	Ireland	227
Pennsylvania	176	Scotland	12
New York	94	German Empire	94
Tennessee	32	France	10
Kentucky	34	Italy	1
District of Columbia	23	Switzerland	6
West Virginia	132		
New Jersey	6	Total Foreign-born	505
Total Natives	35,205		

Acreage of Augusta county, Va., and its condition.—By the best data available, Hotchkiss' map of 1870, the area of this county is a little over 1,000 square miles. We call its area in this article 1,000 square miles or 640,000 acres. The following table, from the U. S. census reports 1850 to 1880, shows, approximately, how much of this acreage is embraced in farms as improved, or under cultivation, or as unimproved, or in forest.

Acres in farms..	1850.	1860.	1870.	1880.
Improved	178,695	224,644	222,843	246,543
Unimproved	155,981	213,515	187,028	253,026
Totals	334,676	438,159	409,871	499,569
Value of farms	$7,033,273	$10,997,286	$10,232,552	$10,032,679

These figures for 1880 would indicate that all the land of the county, except 140,431 acres, was at that time embraced in farms, and that 393,457 acres, or over 62 per cent of the whole, were unimproved, or still in forest.

By the above figures the average value of the land embraced in farms was $21 per acre in 1850, $25 in 1860, $25 in 1870, and $20 in 1880.—An inspection of the table will show that the average price for 1880 was made so much lower than that for 1870 by including in the farm acreage of 1880 so much more unimproved land than in that for 1870.

The following figures for this county are given in the census of 1880:

Number of farms	2,357
Number of acres in farms	499,569
Number of acres unimproved	246,543
Tilled, including fallow and grass in rotation, whether meadow or pasture	232,037
Permanent meadows, pastures, orchards and vineyards	14,506
Unimproved in farms	253,026
Woodland and forest	245,223
Other unimproved, including old fields not growing woods	7,803
Value of farms, including lands, fences and buildings	$10,032,679
Value of farming implements and machinery	$232,340
Value of live stock on farms June 1, 1880	$930,516
Cost of building and and repairing fences, 1879	$67,716
Cost of fertilizers purchased 1879	$82,150
Estimated value of all farm products sold, consumed or on hand, for 1879	$1,377,695

Agricultural products of Augusta county, Va.—The following table presents the quantities, in bushels, of the cereals produced in this county in each census year from 1840 to 1880:

	1840.	1850.	1860.	1870.	1880.
Potatoes, Irish	48,357	24,386	42,766	28,090	33,923
" Sweet	....	3	1,361	498	1,680
Wheat	324,332	419,006	307,402	463,276	522,341
Indian Corn	384,408	505,800	752,530	280,380	727,235
Oats	244,889	250,026	191,379	234,492	122,337
Rye	92,227	28,104	57,479	29,835	16,000
Peas and Beans	....	171	2,642	209	502
Barley	71	1,396	477	516	3,733
Buckwheat	2,879	2,461	7,030	526	1,791
Total	1,097,163	1,431,353	1,363,066	1,037,822	1,429,542

The product of these cereals of 1880 gave an average of over 40 bushels per capita for the entire population of the county, a quantity large enough for 8 times the number of its inhabitants.

The other vegetable products of Augusta county at five census-takings, from 1840 to 1880, were as follows:

	1840.	1850.	1860.	1870.	1880.
Clover seed, bush	.....	4,781	8,342	499	2,678
Other grass seeds, bush	.....	607	2,942	803	1,091
Hay, tons	7,953	15,285	21,687	19,671	23,931
Hops, pounds	408	142	875	216	.....
Tobacco, pounds	.....	.....	40,727	2,000	1,827
Flax, pounds	24,640	11,771	4,528	4,799	.....
Flax seed, bush	.....	781	408	147	17
Maple sugar, pounds	844	380	585	669	.....
" molasses, gals	.....	28	5,915	25	.....
Sorghum molasses, gals	.....	.....	.....	13,105	11,318
Wine made, gals	25	165	1,168	2,028	.....
Honey, pounds	.....	2,884	17,116	9,238	13,754
Beeswax, pounds	130	.....	843	489	624
Orchard products, value	$3,393	$1,790	$15,229	$52,706	$56,053
Forest products, value	.....	.....	.....	$20,129	$65,468
Wood cut, cords	.....	.....	.....	.....	53,279
Market garden produce, value	$105	$161	$890	$313	$1,778

(Continued on page 136.)

Protection and the South.—Under the headings "The South's Great Need," "A Wise Protective Policy the only Hope of the South," the *Baltimore Manufacturers' Record*, one of the most sturdy and able of the many journals that now advocate the industrial development of the South, has the following strong article in its issue of Aug. 9, 1884, all of which applies to the Virginias, especially to their congressional districts that abound in mineral and other undeveloped wealth and that are likely, by the force of events, and by the want of independence of action by their voters, to be *misrepresented*, in so far as their real business interests are concerned, by the men they will this fall elect to the next Congress.

"The 'Manufacturers' Record' has persistently, without ever faltering, labored for the good of the South; and, feeling assured that the future of that section depended upon a wise protective policy, we have urged its importance upon the people of the South, believing it to be equally as necessary to the prosperity of the farmers as of the manufacturers.

We are glad to know that there are so many of the ablest men of the South who, holding as we do that protection is essential to the prosperity of their country, are trying to impress this truth upon those around them. Among this number is Mr. Samuel Noble, of Anniston. We know of no man in the whole South who has a better right to speak upon this subject. It is to him that Alabama is indebted for Anniston and all its thriving industries—a town that is in many respects unequaled in this country. Mr. Robert P. Porter has written of Anniston, that—

'It is a pretty town, situated amid the rich mineral hills of the state, and boasts of an industrial population of 5,000, who, as a whole, are better fed, better clothed and better housed than the inhabitants of any town in the South. Anniston is a new town. Its entire history covers but one decade. Ten years ago it was a cotton field, the ruins of a worn-out, moss-grown blast furnace being the only indication of manufacturing. Before the advent of diversified industries, the country was so poor and the people so poor that no one could be found to pay the homestead fee of $14 for eighty acres of land. In 1873, Samuel Noble, a native of Cornwall, England, started a blast furnace at this point, to make charcoal iron. It prospered, and since then two additional charcoal furnaces have been erected. Next a large cotton mill was added to give employment to the daughters of the miners and mechanics. Car-wheel works, rolling mills and foundries followed, and, lastly, a freight-car manufactory, besides numerous minor industries. Now Anniston has well laid out streets, with growing shade trees, public squares, opera house, business blocks of the most substantial order, a national bank, and the most comfortable homes for working people that can be found anywhere. The best Queen Anne inn yet built in America will be open for the the public this year; it will cost $400,000, and the inside decorations, I was told, will be equal to any hotel in New York. There is an armory for training the boys in walking and the use of arms, and good public schools. Within the last few weeks Mr. Noble has headed a subscription for $20,000 to endow a normal school. Other public-spirited men have followed, and work on the new school building is begun. About 2,500 persons are engaged in gainful occupations, and their wages vary from $1 to $3, and, in some cases, $5 a day. Many of these working people, colored and white, formerly lived in one wretched room of an old log house. Today they live in well-furnished three and four-room houses, carpets on the floor, curtains at the window. and substantial furniture throughout their dwellings. The diversified industries of Anniston have increased the value of land, until, instead of going beging for any one to pay the homestead fee of $14 for eighty acres, it now sells from $200 to $10,000 an acre within the corporate limits, and the farming country around is worth $25 an acre.'

Now, the man who has planted that town must surely feel a deep interest in the South, and must understand something of its needs. He is a Democrat, but it is needless to say, that he is a firm believer in the American system of protection, that he attributes the rapid development of Anniston to protection, and that he firmly believes its decline and fall would follow should the free trade or 'tariff for revenue' doctrines of the politicians prevail. Mr. Noble, in a late interview with Mr. Porter, of the Philadelphia Press, justly claims that the men who, like himself, are building up the South, developing its resources, adding millions and tens of millions of dollars to its wealth, opening up profitable employment to thousands of laborers, and giving farmers home markets for their produce, receive but little encouragement from Southern statesmen, and not much from many Southern papers. He says:

'Our statesmen and press are never tired of talking and writing about our enormous mineral resources, the fertility of our soil, the wealth and splendor of our climate. They say 'bring your money, bring your brains,' and then denounce us as 'takers of blood money,' as 'men enriched by the alms of the government,' as 'robbers fattened by federal legislation at the expense of the planter and the consumer,' the very men who have brought about the dawn of better times to the South. In short, they advocate a policy that will bring certain and absolute ruin to every manufacturer in their midst, as well as impoverish the labor of their country.'

In speaking of how the tariff helps the planters. Mr. Noble said: 'The duty is levied for the benefit of the artisan, the laborer and the planter, who are benefited by protection one hundred fold more than the manufacturer. For example, not long ago, when I was in Europe, I found in Austria the managers of two of the finest charcoal furnaces I ever saw receiving sixty cents per day; for the same services we were paying $1,800 a year. The men at work in the mines received from twenty-five to twenty-eight cents per day; while women, who were as coarse and weather-beaten and hard-featured as the men, and could only be distinguished from them by the short woolen skirt and bonnet they wore, received about twenty cents. In the Austrian capital I found the women dug the cellers, mixed the mortar, carried bricks up the scaffold and did the hardest and most severe labor—labor almost wholly delegated to men in this country. A reduction of the tariff below the danger line means competition with this sort of labor. It is little better in Germany, though a return to protection has improved it somewhat. In England, the Cornish miners, driving tunnels in the mines, receive $15 to $17 per month, while we pay $60 to $65, carpenters, stone-masons and laborers receive less than half the wages we pay in Alabama.' After pointing out the very general shrinkage in values that would follow tariff reduction, Mr. Noble says:

'The South is in no condition to stand a shrinkage. We have but limited supplies, and we accumulate but slowly. How can it be otherwise, pursuing, as we have done for nearly a century, only one industry, the cultivation of the soil, each farmer coming into competition with his neighbor, all engaged in the same pursuit and shiping the products of their labor thousands of miles to a middle ground, where it came in competition with the cheap Fellah labor of Egypt and of one hundred millions of laborers in India, who are paid a few cents only a day? Is it any wonder our people are poor? How can they be otherwise? How can they accumulate anything when, year after year, they are butting their heads against such competition—competition ren-

dered keener every year by improved means of transport ation in India and shortening time and lessening risks by way of the Suez canal? It is our planters who pay the cost of transportation of their product, the handling, waste, loss of interest in geting it to market, and the transportation and loss and waste and interest of what they receive in return.'

This system has impoverished them. They are to-day little better off than the foreign labor with which they compete. Not one in ten of our farmers have barely the necessities, let alone the comforts, of civilized life.

'In a recent trip through the South I was struck with the poverty of the people outside the new industrial centres, where diversified industries have changed everything, although there are no people on this continent that work harder, longer hours, through heat and cold, and have less to show for it than our farmers. I spent two weeks last fall in a trip through the adjoining counties. The weather was fine and I did not see an idle man, woman or child, white or black, old enough to work. They were busy from morning till night.

'The secret of the trouble is the lack of diversified industries. I asked a farmer whose orchard was dying out why he did not plant more trees. His reply was that he could could not sell his fruit and he had enough for his own use. Where I stoped over night I saw a large flock of bronzed turkeys. I asked the landlady why she did not sell them. She replied, 'I did take a wagon load to town and could only get seventy-five cents for a gobbler and take it in trade, so I brought them home again.'

'This, indeed, tells the story in a way that every farmer will understand.'

'Until we bring the artisan to the door of the farmer our country and people will always be poor. If the farmer feeds the artisan, he, in turn, will build the farmer's house, plaster the walls, paint it, paper it, carpet the floor, and put in suitable furniture—in short, will improve his condition. But our policy has been to keep the artisan of the North and Europe, while we raised the raw material to be worked up into manufactured goods by labor paid higher wages than our farmers can earn, and besides having the help of mechanical power that did the work of millions of men. If our state was dotted all over, as the Western states are, with such towns as Atlanta, Chattanooga, Anniston, etc., the farmer would have a market at his door, saving time, all costs and risks, and enabling him to buy a hundred comforts he otherwise must do without.

'The North and West, by availing themselves of the protective policy of our government, have established manufactories everywhere. They have brought the farmer and the workingman together, each working for and promoting the comfort of the other. The result is they have grown in population, power and wealth, far surpassing anything ever known in the history of any people in the world. They have increased their purchasing power so that they can buy anything we have to sell. All Europe sends us its surplus manufactures, while we, like a spoiled child, are pouting and refuse to avail ourselves of the wise legislation of statesmen, who, when they advocated a protective policy, builded better than they knew.

'The only portion of our state where lands increase in value and our people in prosperity are where manufacturing goes hand in hand with agriculture. Our people, our politicians, are in the same old rut, the same policy of a half century ago; they will learn nothing by the past, nothing by what is before their eyes. We, more than any section of our country, need a protective tariff, one high enough to keep out every dollars worth of everything we can manufacture or produce at home.

'What we need is the certainty of the continued system of legislation and finance that will bring a quick and easy exchange of commodities among our own people; that is best done by keeping our money at home. The party who forces free trade or so-called revenue reform upon the country will remain in power only till the people can get to the polls to turn them out."

The New Orleans Exposition.—Gov. Cameron has appointed as the Virginia Commissioners to the New Orleans Exposition the following: Lawrence Lottier, of Richmond city, A. H. Drewy, of Westover, Charles City county; Randolph Harrison, Va. Commissioner of Agriculture, Richmond city; H. C. Parsons, Natural Bridge, Rockbridge county; V. D. Groner, Norfolk city. These gentlemen, with Governor Cameron and the U. S. Commissioners for Virginia, J. M. Blanton, of Portsmouth, and J. B. Pace, of Richmond, constitute the Virginia board, the body that has charge of Virginia's interests in the New Orleans Exposition and the spending of Virginia's portion of the U. S. appropriation.

The "State," of Richmond, says: "That Virginia will send to the exposition a fine display of her minerals and other products seems very probable."—"The Campaign," of Richmond, says: "In a conference held on the 23d inst., between Commissioner general Morehead, and a number of leading business men of Virginia, including Governor Cameron, U. S. Commissioner Blanton, Commissioner of Agriculture Harrison and Gen. Groner, a comprehensive plan was adopted for securing to this state a grand exhibit of its material resources at the World's Exposition of New Orleans. Headquarters for the state will be in Richmond, while deposits for the reception of exhibits will be opened at Burkeville junction and Bristol, Tenn. The railroad and other large interests will be asked to co-operate and make large exhibits, while the Commissioner of Agriculture will canvass the various counties in the agricultural interest. Gov. Cameron will, agreeably to the sense of the meeting, organize an exposition board, irrespective of party, composed of men representing the various interests of the state, its minerals, timber manufacturers, agricultural and live stock interests. Leading men here think very highly of the plan and anticipate the happiest results."

It is to be regreted that the Virginia commissioners above named were all but one selected practically from one grand division of the state, and that those chosen represent so few of the states's interests and industries; there is not one in the number, so far as we know, that is in any way connected with mining or metal manufacturing or with lumbering in Virginia. The only thing fairly represented in the board is tobacco, an interest that as a rule generally takes care of itself. We hope this board will do more than we are now disposed to think it will.

In a recent letter from Mr. F. J. Kimball, president of the Norfolk & Western and Shenandoah Valley railways, he writes: "It has occured to me that it would be a good thing if you would call attention in your next issue of *The Virginias* to the Exhibition at New Orleans which opens December 1st, and which, from all I can learn, will be an extremely important event for all the Southern states. And as it occurs at a season of the year when there is heavy travel to Florida and the South, generally, it ought to attract a very large attendance from all the Northern states.

Virginia should be well represented and our railroad companies propose to do their share. We are now thinking of sending a standard freight and a standard passenger engine, made at the Roanoke Machine Works, to the exhibition, as I believe the works at Roanoke are the only shops in the South, where locomotive engines are constructed. This ought to make an interesting exhibit."

The Railway statistics of the Virginias for 1883, from the advance pages of Poor's Manual on the Railways of the U. S., are as follows:

	Virginia.	West Virginia.
Total line, miles	2,808.49	400.65
Total track, miles	3,221.62	465.88
Steel rail in track, miles	1,917.21	249.59
No. of engines	588	22
No. of passenger cars	290	21
No. of B. M. and Ex. cars	157	2
No. of freight cars	13,055	560
Share capital	$94,483,078	$15,074,198
Funded debt	$91,262,214	$ 6,571,000
Total investment	$196,435,050	$21,989,545
Cost of road and equipment,	$167,855,270	$17,502,873
Length of line operated, ms.	2,738.80	168.96
Passenger train service, ms.	3,851,028	503,332
Freight train service, miles.	7,825,370	706,263
Passengers carried in 1883,	2,805,653	381,832
Passenger movement, miles,	109,058,878	14,285,730
Freight moved, tons	5,939,499	1,190,812
Freight movement, ton-miles,	734,475,929	50,180,132
Gross earnings from passengers	$3,167,581	$302,073
Gross earnings from freight,	$9,789,435	$610,119
Gross earnings from all sources	$13,984,440	$921,688
Net earnings	$5,119,519	$308,365
Total available revenue	$5,318,611	$337,385
Payments from revenue; int.,	$3,840,344	$31,359
Payments from revenue dividend on stock,	$848,090	$16,400

Virginia had more miles of railway than any other of the southern states east of the Mississippi except Georgia, which exceeded it by a few miles, and the total investment in railways within her borders was considerably greater than in any other of these states.

St. Lawrence Boom and Mfg. Co.—The Highland, (Va.) "Recorder" of the 2d states that Col. John Driscol, of this great lumber company of Ronceverte, Ches. & Ohio Ry. W. Va., has moved his lumber camp to near Dunmore, on the upper Greenbrier river, Pocahontas county, W. Va., and commenced cuting the white pines in that vicinity. It adds: "There will be four camps run this winter, and the probability is that they will cut forty million feet. This lumber company gives a good market for the surplus beef, grain, vegetables, etc., and brings money into our county for timber and lands that heretofore have only been an expense to taxpayers."

The Virginia Beach RR., and Improvement Co., at its recent annual meeting, elected Hon. J. W. Hopkins, of Pittsburg, Pa., its president, C. W. Mackey vice-president, and J. M. Dickey general manager The round trip fare from Norfolk to Virginia Beach was reduced to 50 cents. It is proposed to at once increase and improve the hotel accommodations at the Beach so as to make it a winter as well as a summer resort and to attract Northern travel on its way to and from Florida.

The Cotton Movement for 1883–84, from Sept. 1 to July 25, has brought 579,926 bales to Norfolk and 222,245 bales to West Point, making the movement of this cotton-year to Virginia ports, so far, 802,171 bales,—a considerably larger quantity than has reached the ports of any other state except New Orleans.

Augusta County Statistics.

(Continued from page 133.)

The production of various crops to the acre in Augusta county, in 1879, may be learned from the following table of acreage cultivated and crops gathered as reported in the census of 1880:

	Acres.	Product.	Per acre.
Buckwheat	196	1,791 bus.	9.1
Oats	8,510	122,337 "	14.4
Indian corn	31,334	727,235 "	23.2
Rye	1,955	16,000 "	7.7
Wheat	44,966	522,341 "	11.7
Barley	182	3,733 "	2.5
Hay	25,895	23,931 tons.	0.9
Tobacco	4	1,827 lbs.	456.8

The Live Stock statistics of Augusta county for half a century, from 1850 to 1880, are reported by the U. S. census returns as follows:

Census.	1840.	1850.	1860.	1870.	1880.
Swine	32,445	29,975	31,033	19,211	23,348
Horses	9,910	7,445	8,852	7,599	8,477
Mules & asses		68	210	64	240
Cows		6,196	6,441	6,232	6,712
Oxen		41	198	108	71
Other cattle	21,479	13,638	14,206	11,323	14,947
Sheep	19,660	16,316	13,013	8,211	12,510

In 1840 mules and asses were enumerated with horses and there was no separate enumeration of cows and oxen.

Census.	1850.	1860.	1870.	1880.
Value of live stock	$825,361	$1,287,615	$1,086,917	$930,516
Value of animals slaughtered	$158,501	$254,383	$346,890	. . . . .

The following table presents the dairy statistics of this county for 40 years. Considering the slight variation in the number of cows at each census the changes in the quantities of dairy products is quite remarkable.

	1850.	1860.	1870.	1880.
Cows, number	6,196	6,444	6,232	6,712
Butter, pounds	275,483	451,305	353,335	433,994
Cheese, pounds	12,094	15,103	2,068	2,186
Milk sold, galls.	. . .	. . . .	1,206	8,535

The results of the wool-growing industry of this county for 50 years are shown in the following table:

	1840.	1850.	1860.	1870.	1880.
Sheep, number	19,660	16,316	13,013	8,211	12,510
Wool produced, pounds	30,980	42,004	35,810	23,291	57,468
Average lbs. to a sheep.	1.6	2.6	2.7	2.8	4.6

The increase in the quantity of wool produced by each sheep, on an average, as shown above, is very noteworthy.

Fall of rain, including melted snow, as recorded in inches and decimals of an inch, at Washington & Lee University, Lexington, Rockbridge county, Va., for 13 years; 1870–1882, especially prepared for *The Virginias*:

Years.	1870.	1871.	1872	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	Monthly Totals.
January	4.71	3.34	1.43	3.80	4.54	2.79	0.75	3.74	5.23	3.74	2.63	4.24	4.92	45.86
February	2.60	3.58	1.93	4.93	2.98	3.82	2.50	0.40	2.20	2.30	3.14	3.51	3.33	37.22
March	4.92	4.86	3.24	2.39	1.90	3.84	5.28	2.09	2.83	1.08	5.78	2.53	3.21	43.95
April	3.61	2.53	2.52	3.06	7.94	3.45	2.70	3.73	4.44	2.83	4.03	2.14	3.06	46.04
May	5.02	5.55	1.74	7.40	1.21	0.81	4.08	2.16	6.18	3.33	1.69	1.20	4.64	45.01
June	5.47	2.57	3.03	4.60	3.92	2.54	3.70	4.64	3.05	2.74	4.03	3.56	2.36	46.21
July	7.10	4.09	2.98	5.91	2.86	4.59	5.80	2.65	3.86	4.45	5.64	0 77	2.60	53.30
August	4.04	2.40	4.54	4.76	3.34	5.46	5.79	1.59	4.68	6 08	3.69	0.82	4.68	51.87
September	15.88	2.65	3.50	1.13	3.69	2.10	6.79	3.58	5.07	2.49	3.24	4.17	7.39	61.68
October	2.87	3.27	2.41	1.96	1.19	0.89	1.14	6.51	3.67	2.48	0.37	3.29	1.99	32.04
November	1.77	2.96	4.34	2.45	2.56	3.83	3.54	9.17	3.36	1.39	3.71	3.22	0.90	43.20
December	2.05	1.63	3.30	2.02	1.90	3.42	1.04	1.85	4.67	5.39	2.73	6.27	1.65	37.92
Annual	60.04	39.43	34.96	44.41	38.03	37.54	43.11	42.11	49.24	38.30	40.68	35.72	40.73	

Average for 13 years . . 41.87 inches.
" " 12 " . . . 40.36 "

Remarks.

1. The great rain of Sept. 29–31, 1870, which at Lexington gave 14.03 inches of water, produced an aggregate for that month, as well as for that year, much above the monthly and yearly averages for the next succeeding 12 years That was the cause of the well-remembered flood in the Potomac and James rivers.

2 The table shows that Rockbridge county is not very liable to frequent or long continued droughts. The severest within the 13 years reported, was in July and August, 1881.

3. By suming up the rain-fall for the four seasons, (after reducing the abnormal Sept., 1870 to the normal for that month) we find from the table that autumn is the dryest season, winter the next, and summer the wetest of all—estimated by the actual quantity of rain-fall. But two circumstances must be borne in mind in fairly estimating apparent results: (1) there is much more rapid evaporation in summer than in any other season, and (2) the frozen ground of winter causes a very large flow of water from the surface into the streams. John L. Campbell.

W. & L. U., Aug. 1884.

The Anthracite coal beds of Berkeley county, W. Va., were the subject of an extract from the "Winchester Times" in our July, 1884, number; on page 17 of our February number we gave a description of the Meadow Branch coal-fields from the same paper, with comments warning investors not to place too much reliance on the statements made about this field from imperfect and partial explorations. We intended to have commented in the same way about the item published last month, but failed to do so. Below is an item from a recent issue of the same paper, and we are constrained, in the best interests of mineral development in the Virginias, to remark of it that the statements made do not warrant the (somewhat general it is true) conclusions reached.

All these anthracite basins are *shallow, very limited in area*, and the beds of coal are *so variable in thickness* as to render them almost worthless. No one has ever *proved* that they have a *commercial value*.

"The following extracts are from a letter of late date from the well-known civil engineer, Mr. Chas. P. Manning, who located the lines of the Baltimore and Ohio Railroad from the Cumberland to Wheeling, and who it will be seen writes from a personal knowledge of the facts he refers to:

Baltimore, June 20, 1884.

John F. Ehlen, president of Meadow Branch Anthracite Coal, Iron and Lumber Co., Baitimore, Md.

Dear Sir.—In your communication of the 17th of May, ult., you ask for a writen statement of my opinion as to the existence of anthracite coal upon the land of your company in Berkeley and Morgan counties, W. Va., the character and extent of such formations, and the source of my personal knowledge, &c.

In reply I offer the following brief statement of facts relating to a personal examination of your property, and the result of your practical mining experiment there:

In the following month of December last, I again visited the region and spent two days in a careful investigation of the northern portion of the property (near the confluence of Meadow branch with Sleepy creek), where you had reopened an old shaft into which I descended and ascertained the existence of a large workable vein of pure anthracite coal there traversed by a horizontal drift for some 50 or 60 feet from the perpendicular shaft at a depth of about 40 feet below the natural surface of the ground.

This unmistakable development, combined with other equally satisfactory indications of the presence of anthracite coal at various points over a large extent of the company's property, warrants the supposition that the whole property is underlaid by a basin of anthracite coal, composed of several strata, "seams" or "veins."

As to the character and quality of this coal, I had the practical evidence of open-air fires at the mouth or opening at the top of the shaft, as well as seeing it burnt at an open grate in this city, and from these tests I am fully satisfied that it is anthracite coal of a superior quality.

Chas. P. Manning.

These mines are about twenty miles from Winchester, Va.

The advantages of mining a thick bed of coal have been strikingly illustrated at the Pocahontas mines of the S. W. Va. Improvement Co., Tazewell county, Va., where recently, for several days in succession, 1,000 tons of coal were mined during 12 hours of each day from the No. 3 or 'big bed." This shows what a productive capacity the great Flat-top region will have when a dozen mines are opened and operated in the same great semi-bituminous coal bed of the Flat-top coal field in the Lower Coal measures of the Virginias.

A recent analysis of the "*run of the mine*" of this coal bed, in the East mine at Pocahontas, by A. S. McCreath, of the Pa. Geol. Sur gave:

Water	0.684	Sulphur	0.656
Volatile matter	19.964	Ash	5.675
Fixed Carbon	73.021		
		Total	100.000

Zinc Oxide from Longdale, Va.—In the "Journal of the Elisha Mitchell Scientific Society" of N. C., we find the following:—"As is well known these deposits of impure zinc oxide are sometimes found in a furnace where zinc-bearing ores are used. The name cadmia is given them in Dana's mineralogy. The green flame of burning zinc is noticed at the tymp of these furnaces, and was formerly looked upon by furnace-men as indicative of sulphur—especially as this burning left a substance in the near neighborhood of the tymp of a coating of zinc oxide which was yellow whilst hot. The specimen examined was sent through the courtesy of the manager of the Longdale Iron Co's furnaces. According to analysis no zinc is contained in the ores used by this company, the said ores being ordinary brown hematite. Nor has zinc been found in the coke and limestone used—evidently occuring then in minute traces, probably in the ore. The deposit was very large, nearly choking the mouth of the furnace. The specimen had a laminated appearance, as if deposited in layers, and was greenish-brown in color. It was quite hard, breaking in thin plates, like shale, in the direction of the lamination and the specific gravity was 5.0405 (temp. of water 16°C).

The analysis gave:

Zn O	93.34
Pb O	2.37
Fe (metalic)	1.09
Ca CO_3	1.01
C	.20
SiO_2	1.11
	100.02

Thos. Radcliffe.

Chemical Laboratory,
University of N. C.

Analysis of Saltville, Va., Rock-salt.—In the recently issued "Journal of the Elisha Mitchell Scientific Society" of N. C., we find the following:—"A specimen of this rock-salt sent by the superintendent of the salt-works in the valley of the Holston, yielded on analysis somewhat different results from the previously published analysis (Chem. News, No. 1038) and in view of this and the claim made for this Virginia brine, that it exceeds in purity nearly all others of which analyses are on record, the analysis made in this laboratory is published. The specimen was brownish-red in color, with a crystaline structure and was obtained whilst deepening one of the salt wells. This rock salt is not mined, the brine alone being used for the manufacture of salt. The capacity of the works is at present 450,000 bushels per year, though, at one time, during the late war, the yield was as high as 10,000 bushels per day.

According to this analysis the rock-salt contained:

Na.Cl	93.05	Fe_2O_3	.83
K.Cl	trace.	SiO_2	2.81
Ca SO_4 $2H_2O$	2.40	H_2O	.30
$MgSO_4$	.07		
		Total	99.46

An analysis of the salt as marketed gave 98.89 per cent NaCl with a small percentage of $CaSO_4$ $2H_2O$ and a trace of Mg SO_4 showing it to be a high grade salt.

Chemical Laboratory, Thos. Radcliffe.
University of N.C.

The Knapp gold mine, near Andrews, Spotsylvania county, Va., consisting of 50 acres of land, buildings and mining and milling machinery, was aecently sold, at auction, for $2,100 and purchased by Jas. P. Runyon.

Virginia minerals for the New Orleans exposition are now being collected along the line of the Chesapeake & Ohio Ry. by Prof. Fred P. Dewey of the United States National Museum, to form part of the exhibit of the mineral resources of the U. S. that will be made by that Museum, under the direction of the Smithsonian Institution, at the forthcoming exposition at New Orleans. We infer that Prof. Dewey will collect for this exhibit along all the railways of Virginia and probably West Virginia.

We are pleased that Prof. Baird has put this matter in the hands of one so competent and active as Prof. Dewey, as it gives the assurance that our mineral resources will be properly represented.

Personals.

Mr. Walter L. Nicholson, we are greatly pleased to hear has been reappointed Topographer of the P. O. Dept., with his office at 420 9th St., N. W., Washington, D. C.—Mr. N. has been one of the best of officials, a man thoroughly competent and devoted to the difficult work he had in charge, and it was a matter of general regret that he had been displaced. The work of preparing good postal maps of the various states that he began and had so well advanced will now, we presume, be continued, to say nothing of other topographical work for the general good that he always zealously participates in.

Trout-fishing.—The "Highland, Va., Recorder" reports that three fishermen recently caught 600 mountain trout in upper Cheat river, Randolph county, W. Va., and that one fisherman has taken from North fork Greenbrier river 2,000 of the same delicate fish.—The "Charleston, W.Va., Times" reports that a fishing party from that city caught 814 speckled trout in Big Clear creek, Greenbrier county.

The Tariff Question.—The Ironton, Ohio, "Register" of a late date has the following sensible editorial. Ironton is the capital of the great "Hanging Rock" iron region:—"Our democratic friends are encouraged to take the free trade bull by the horns by the prevailing prostration of our industries; and the argument is "look, see business stagnation and labor unimployed, and all this under a protective tariff!" But sensible men will look further than this, and all ought to look at it as a business question affecting their nearest interests. First then, ask, what would result if protection duties were removed, and our home markets invaded by foreign fabrics? Would it not remove all hope from American industry? Suppose the tariff were taken from American pig iron, would not every furnace in the land surrender and blow out never to resume? And so, with other industries? If not, never, at least until wages come to the European level? And when that point was attained; would not the same question of home competition affect the situation as now? Competition would not be any less fierce because labor declines in price than in any other element of cost declines.

There is hope when our competition is simply among ourselves. The serious results of this can be largely moderated by wholesome laws regulating contracts, corporations, speculation, debt and all those things that poison healthful rivalry and gnaw at labor. These things can, in time, be rectified. They even adjust themselves by periods. But the direct question to every man is this: If we can't extricate ourselves from business depression brought on by competition among ourselves, how are we to improve the situation by introducing foreign competition also? If our furnaces can't thrive by selling iron at $15 a ton, will they flourish by selling it at $12?

The Virginias.

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Staunton, Va., September, 1884.

Jed. Hotchkiss, Editor.

Virginia Minerals for the New Orleans Exposition.—Major Jed. Hotchkiss, the Asst. U. S. Commissioner for Virginia to the New Orleans Exposition, in charge of Dept. IV, Ores, Minerals, etc., which he is now collecting, proposes to publish in *The Virginias* a list of all the exhibits collected or sent him for this Department, grouped by counties, giving consecutive numbers to those from each county, followed by the name and Virginia address of each contributor and concluding with the general collection numbers in parentheses. The following list is to September 27th 1884.

Now that the railways have agreed to send all specimens to Major Hotchkiss to Staunton, Roanoke, Bristol and Danville, without charge, he ought to be able to collect many things from each county in the state and be enabled to make a grand Virginia exhibit.—See his appeal elsewhere.

Botetourt county.

1. *Manganese*, from H. C. Snyder's land, 3 miles from Buchanan.—Capt. F. J. Chapman, Salem. (1).

2. *Red-shale iron ore*, from Clinton, No. V, beds in Purgatory mountain, three-fourths of a mile from Buchanan station of R. & A. RR. This specimen is from a pile of some 300 tons now mined and stocked at one point on an extended outcrop that has been uncovered at six places and shows a regular thickness of from 18 to 28 feet.—Capt. F. J. Chapman, Salem. (2).

3. *Manganiferous iron ore* from same locality as preceding.—Capt. F. J. Chapman, Salem. (3).

4. *Red specular iron ore*, from Arcadia furnace property 4 miles east from Buchanan on road to Peaks of Otter, from Potsdam, No. I, beds.—Capt. F. J. Chapman, Salem. (4)

5, *Manganese*, from Houston iron mine, near Houston station of S. V. RR. Used for spiegel at Cambria works, Johnstown, Pa.—Capt. F. J. Chapman, Salem. (15).

6. *Marble*, from Siluro-Cambrian beds, No. II, from Thomas' on Catawba creek 3 miles east from Roanoke Red Sulphur Springs.—Capt. F. J. Chapman, Salem. (16.)

7. *Calcite*, from line of S. V. RR. 2 miles east from Buchanan.—Capt. F. J. Chapman, Salem. (19).

8. *Pyrite*, from Lunsford's near Bonsack station, N. & W. RR.—Capt. F. J. Chapman, Salem. (21).

Chesterfield county.

1. *Bituminous coal*, from Brighthope Ry. Co. mines in S. part of county on Winterpock creek and near Appomattox river, from bed 25 ft. thick in Jurasso-Triassic formation.—J. R. Werth, Supt., Richmond. (38).

2. *Glass-sand*, very fine quality, from Bermuda near James river.—J. R. Werth, Richmond. (39).

3. *Bituminous coal*, from Etna mine near Coalfield station of Richmond & Danville RR.; from Midlothian field of Jurasso-Triassic.—Albert Blair, Agent, Richmond. (40).

4 *Carbonite, natural coke*, from Eureka coke mine near Coalfield station R. &. D. RR.—Albert Blair, Agent, Richmond. (41).

Craig county.

1. *Slate* from Devonian beds, No. VIII, from Craig creek valley 3 miles W. from Roanoke Red Sulphur Springs.—Tested and found to exist in great quantities and of a superior quality.—Capt. F. J. Chapman, Salem. (17).

2. *Manganese*, from Light land 7 miles west from New Castle and 2 miles from preceding. Indications good for a large deposit.—Capt. F. J. Chapman, Salem. (18).

3. *Manganifarous iron ore*, from Kyle's on John creek 6 miles N. W. from New Castle.—Capt. F. J. Chapman, Salem. (20).

Franklin county.

1. *Asbestos*.—Capt. F. J. Chapman, Salem. (33).

2. *Allanite*, from McMannaway mountain, 6 miles from N. & W. RR.—Capt. F. J. Chapman, Salem. (34).

Montgomery county.

1. *Limonite*, massive, brown iron ore from an extraordinarily large deposit of Potsdam, No. I, ore on the Spindle lands near Alleghany Springs, near line of N. & W. RR.—Capt. F. J. Chapman, Salem. (10).

Pulaski county.

1. *Limonite*, from Rich Hill mine of D. S. Forney, near Allisonia, Cripple Creek region of N. & W. RR.—Capt. F. J. Chapman, Salem. (27).

2. *Zinc ore*, from Bertha mine, in No. II, Cripple Creek region of N. & W. RR. The ore used at Bertha Zinc works, Pulaski station, N. & W. RR.—Capt. F. J. Chapman, Salem. (31).

Roanoke county.

1. *Limonite*, cellular, brown iron ore, from Poor Mountain mine No. 3, one mile from N. & W. RR., 13 miles S. W. from Roanoke station. From very large stratified deposit of Potsdam, No. I, ore uncovered for 40 by 32 feet.—Capt. F. J. Chapman, Salem. (5).

2. *Limonite*, massive, brown iron ore from a pile of some 3,000 tons of clean lump ore quarried from Poor Mountain mine No. 1, near preceeding, in same range.—Capt. F. J. Chapman, Salem. (6).

3. *Limonite*, clay iron ore, from Poor Mountain mine No. 4, from stratified mass striped 15 wide for 280 feet along outcrop and 1,030 feet above N. & W. RR. track, about one mile distant; adjoins beds of limestone; locality near preceding.—Capt. F. J. Chapman, Salem. (7).

4. *Limonite*, massive, black iron ore from Starkey mine No. 1, in Potsdam, No. I, from an outcrop of solid ore many feet thick that has been fully tested for more than a mile. Lies 6 miles southward from Roanoke city and 1½ miles from narrow-gauge railway of Rorer Iron Co.—Capt. F. J. Chapman, Salem. (8).

5, *Limonite*, cellular, brown iron ore from Starkey mine No. 2. Location, etc., same as preceding.—Capt. F. J. Chapman, Salem. (9).

6. *Limonite*, cellular, brown iron ore,from Hudson shales, No. III, from North mountain near Roanoke Red Sulphur Springs. From the very regular stratified beds of the noted Catawba furnace range.—Capt. F. J. Chapman, Salem. (11).

7. *Hematite*, massive red iron ore from Catawba mountain, near Brand's.—Capt. F. J. Chapman, Salem, (12).

8. *Hematite*, massive, red iron ore from Middle ridge of Catawba mountain range, near preceding. Outcrop shows for over 12 miles.—Capt. F. J. Chapman, Salem. (13).

9. *Semi-anthracite coal.* from Vespertine, No. X, bed in North or Catawba mountain, extending for over 12 miles.—Capt. F. J. Chapman, Salem. (14).

10. *An old miner's sledge* found in the Starkey mine (4 of the preceding) where it has lain since 1813, when the old Back Creek furnace was washed away. This was cast directly from the furnace which used the Starkey ore.—Capt. F. J. Chapman, Salem. (22).

11. *Marl, tufaceous*, from McCormick's on Catawba creek 6 miles S. W. from Roanoke Red Sulphur Springs.—Capt. F. J. Chapman, Salem. (30).

12. *Limonite*, from the Potsdam shales, No. I, from Iron Bluff farm 3 miles from Rorer Iron Co. RR. and 4 miles from N. & W. RR.—Capt. F. J. Chapman, Salem. (32).

13. from Martin's, 3 miles from Roanoke city, from 16 feet below surface, from large deposit.—Capt. F. J. Chapman, Salem. (35).

14. *Roofing slate*, from Catawba valley.—Capt. F. J. Chapman, Salem, (36).

15. *Stalactite, lime carbonate*, from caverns near Roanoke Red Sulphur Springs. This is from a recently discovered 3-storys down cavern in North or Catawba mountain, which has in it rooms over 200 ft. long and 100 ft. high.—Capt. F. J. Chapman, Salem. (37).

Wythe.

1. *Limonite*, brown iron ore from Trenton limestones, No. II, from Walton Furnace mines, Cripple Creek region of N. & W. RR.—Capt. F. J. Chapman, Salem. (23).

2. *Limonite*, from Van Liew Furnace mine; same range and region as preceding.—Capt. F. J. Chapman, Salem. (24).

3. *Limonite*, from Graham Furnace mine; same range and region as preceding.—Capt. F. J. Chapman, Salem. (25).

4. *Limonite*, from Frank Smith mine near Boom furnace; same range and region as preceding.—Capt. F. J. Chapman Salem. (26).

5. *Limonite*, from Boom Furnace mine; same range and region as preceding.—Capt. F. J. Chapman, Salem. (28).

6. *Limonite*, from Pierce Furnace mine; same range and region as preceding,—Capt. F. J. Chapman, Salem. (29).

Goochland.

1. *Mica*, sheets of from E. M. Mehl, Irwin station, R. & A. RR. (48),

Appomattox.

1. *Limonite*, brown iron ore, from Jones and Button mine (or Nuttall), one mile from Walker Ford station, R. & A. RR. (59).

Alleghany.

1. *Fossil* iron ore, from Clinton, No. V, beds in Clifton Forge pass, R. & A. RR.—Geo. M. Bartholomew, Hartford Conn., owner; Henry Body lessee.—Henry Body, Clifton Forge. (77).

Buckingham.

1. *Roofing slates*, from quarry of Edwards & Roberts near New Canton, 3.5 miles from Bremo Bluff station of R. & A. RR.—This quarry has been worked for 18 years; 50 men are now employed there and 8,000 squares of slate are produced yearly. It will soon be connected with R. & A. RR. by branch railway. (49).

2. *Steatite*, soapstone, from Brown's 2 ms from ferry at mouth of Hardware river, R. & A. RR.—Francis Lawless, Lynchburg. (65).

Amherst.

1. *Magnetic and specular* iron ores, from Maud vein mines near Stapleton station, R. & A. RR.—Col. Thomas Dunlap, Stapleton. (60).

2. *Syenite*, blue granite, from Bent creek, near Gladstone station, R. & A. RR.—The durable building stone from which Joshua Falls dam in James river, is constructed. (62).

3. *Roofing slate*, from Snowdon Slate quarry, near Rope Ferry station. R. & A. RR.—Slab and case of different sizes of slates.—Chas. E. Heald, Lynchburg, president of Va. Slate Mining Company.—(63).

Botetourt.

1 *Limestone*, from quarry of Indian Rock Lime-works, Indian Rock station, R. & A. RR.—Edward Dillon, Indian Rock. (70).

2. *Unslacked lime*, burned from above at Indian Rock Lime-works. (70).

3. *Slacked lime*, burned from above. (70).

4. *Limonite* iron ore, from Purgatory Mountain mine, near Saltpetre Cave station, R. & A. RR.—D. Lee Shultz. (71).

5. *Pig iron*, No. 1 grade, charcoal, from Salisbury furnace, near Salisbury station, R. & A. RR.—Eugene Kelley, New York, owner. (72).

6. *Limonite* iron ore, from Rocky Gully ore bed, Purgatory mountain. (73).

7. *Limonite*, brown iron ore, from near Eagle Rock station, R. & A. RR. Analysis by Dr. Koenig, of run of mine, gives 47 per cent metalic iron, low silica and only a trace of manganese.—James L. Burks, Sheets p. o. (74).

8. *Manganiferous iron ore*, same locality, etc., as No. 7. (75).

9. *Limestone*, containing 97.5 per cent carbonate of lime. Abounds at same locality, etc., as No. 7. (76).

10. *Limestone.*—Abundant at same locality, etc., as No. 7. (77).

11. *Limestone*, samples from Lower Helderberg, No. VI, Price's Bluff, R. & A. RR. (78).

12. *Limonite* iron ore from Oriskany, No. VII, mines of Wilton furnace, E. slope Rich-patch mountain.—Capt. D. S. Cook, Carolina p. o. (76).

Bedford.

1. *Granite*, from Coleman Falls station, R. & A. RR. (64).

2. *Iron ore*, red, from near Big Island station, R. & A. RR.—W. E. Sledd. (66).

Rockbridge.

1. *Cement*, samples of limestone, burnt and ground cement, and mortar, from James River Cement Works, Balcony Falls station, R, & A. RR.—H.O. Locher & Co. (67).

5. *Potsdam sandstone*, Scolithus bed, formation No. I, mouth of North river of James, R. & A. RR. (68).

Limestone, from bluff below Natural Bridge station, R. & A. RR. (69).

Henrico.

1. *Granite*, specimens of building stones, in dressed and polished cubes, from Richmond Granite Co's. quarry at Korah station, R. & A. RR., 4 miles above Richmond; H. F. Smith, Supt. Address, box 158, Richmond. (42).

2. *Granite*, two finished monuments, each 10 feet high, from works of Richmond Granite Co., as above. (43).

3. *Granite*, two varieties of Belgian blocks for paving, from Richmond Granite Co., as above. (44).

(Continued on page 153)

The Trias Rocks of Eastern North America.—In the admirable paper on progress in geological science in 1882, in the Smithsonian report for that year, by Prof. T. Sterry Hunt, L. L. D., F. R. S., we find the following account of the Trias of Eastern North America. This is of interest to us in Virginia where we have a number of large areas of the Jurasso-Triassic formations—the red sandstone belts of Loudoun, Fairfax, Fauquier and Culpeper in the northeast; in Albemarle, Nelson and Buckingham and in Buckingham and Cumberland, centrally; in Campbell, Halifax and Pittsylvania in the southwest; and in the Chesterfield coal basin and all along the Railway from Richmond to Washington—to all of which these observations apply in a general way:

W. M. Davis has studied the Trias of the Atlantic border, with its included trappean (diabasic) rocks, as seen in the Connecticut valley and in New Jersey. These igneous rocks, according to him, occur in three different relations to the associated sandstone: (1) as dikes cutting the strata, (2) as intruding sheets, often of great extent and thickness, lying in nearly all cases conformably between the layers of sedimentary rock; (3) as overflowed sheets, equal in extent and thickness to the last, but poured out at the surface during the formation of the sandstones. Examples of the dikes are seen near New Haven, Conn., from 100 to 200 feet thick, with a transverse columnar structure. These mark probably the channels through which the material of the great sheets was brought up. They have produced a very limited alteration proportionate to the breadth of the adjacent strata. The beds of traps of the second class have altered the sedimentary strata both above and below them, and are not accompanied by amygdaloids. To this class belong according to Davis, the Palisades of the Hudson and the range from West Rock northward near New Haven. To this may be added a great dike at Lambertville, on the Delaware, above which tourmaline, epidote and specular iron have been developed in the sandstone. The existence in the regions in question of trappean masses of the third class, or overflows, has not been generally recognized, although maintained by Edward Hitchcock for the Connecticut valley, and also by Dawson for the Trias of Nova Scotia. These subaerial or subaqueous beds are generally very amygdaloidal in the upper portions, and sometimes at their base. The underlying sedimentary rock is but slightly affected, and the overlying bed not at all. Tufaceous layers sometimes accompany these overflows, and fragments of trap are occasionally found in the overlying sediments. These, as Dawson has shown, are frequent in Nova Scotia. Examples of these overflows are seen on Mounts Tom and Holyoke, in the Connecticut valley, and in their continuation in the Hanging Hills of Meriden; also, as lately shown by Prof. Emerson, in the Deerfield mass. Davis next proceeds to consider the question of the general monoclinal arrangement of the strata in the two Triassic areas in question, the dip in the Connecticut valley being to the eastward at angles generally from 10° to 20°, and more, and in New Jersey and Pennsylvania to the westward, with a similar inclination. H. D. Rogers supposed an original obliquity of deposition; Kerr a broad anticlinal in original horizontal strata, the belts of eastward and westward diping beds representing respectively the eastern and western portions of such anticlinals, from which the remainder had been removed by erosion; while E. Hitchcock and Le Conte imagine a simple monoclinal tilting. This would involve an enormous thickness of strata, amounting, as Persifor Frazer has shown, to over 50,000 feet in one measured section in Pennsylvania, a conclusion for many reasons inadmissible. In the view of Davis, lateral compression of the horizontally deposited beds produced a series of folds with peculiar distortion, having the form of long "shallow oval dishes or boats, of gentle curvature canted over a little and faulted on the side of the general monoclinal dip." A careful study of the overflows has enabled him to establish well-marked horizons, and thus satisfactory evidence is obtained that the strata heve been both folded and faulted. In this way is explained the general crescent-like forms of the trappean beds, which everywhere present their convex sides to the upward slope; that is to say westward in the Connecticut valley and eastward in New Jersey. The great intruded sheets of trap which occur only near the base of ehe sandstone series are compared with the western laccolites."

The Luray Caverns are as attractive as ever; a steady stream of delighted visitors is all the time passing over the Shenandoah Valley RR., to or from them. It is reported that over 5,000 people visited them last month. A similar experience is being had at the Natural Bridge, except that at the latter a much larger number of visitors is reported as it is reached by two railways. The best of hotels kept at these places have had much to do with making them popular resorts. There are numerous other places in the Virginias such as Mt. Rogers, on the Chesapeake and Ohio Railway, that would attract equally as many visitors if equally as well prepared to entertain them.

Steel-nail making in W. Va.—The Wheeling Intelligencer of Sept. 22, has the following: The Riverside nailers last week produced 7,564 kegs of steel nails, thus settling the much disputed question whether as many steel as iron nails can be cut in a given time. This is the largest output ever made by any factory in the world, working fifty-five hours a week, and making nails of standard weight.

The coal and coke traffic of Ches. & Ohio Ry., for August, 1883 and August, 1884, are shown in the following table, compiled for *The Virginias*, from official returns, by J. W. Hopkins the fuel agent of this railway.

Kind.	1884.	1883.	Increase.	Decrease.
Cannel	3,688	1.770	1,918	....
Gas	24,395	20,535	3,860	.....
Splint and block	11,836	9,671	2,165	.....
New River, &c	26,952	30,452	....	3,500
Coke	8,179	7,001	1,178	.....
Totals	75,050	69,429	9,121	3,500

The distribution of the above was as follows:

		1884.	1883.
1.	To Ches. & Ohio Co. for its own use	20,446	12,687
2.	To Huntington, for West via. Ohio river	1,461	800
3.	On Elizabethtown, L. & B. S. and K.C.RRs	5,324	2,406
4.	On Ches. & Ohio RR., excepting Richmond	10,358	16,164
5.	To Rich. & Alleghany RR. at Clifton Forge	12	207
6.	To Valley RR. of Baltimore & Ohio at Staunton,	....	.....
7.	To Shenandoah Valley RR. at Waynesboro	20	16
8.	To Va. Midland at Charlottesville	3,987	3,194
9.	To Rich. Fred. & Potomac RR., at Junction	545	108
10.	To Richm'd for consumption, includ'g tugs, &c,	7,541	5,522
11.	To James River wharves for shipment	6,142	12,584
12	To Newport News, For consumption, &c	621	270
	To Newport News, For shipment	18,598	15,521
	Totals	75.050	69,429

The movement from January 1st, 1884, to Aug., 31st, 1884 inclusive, and for same time in 1883, was as follows:

	1884.	1883.	Increase.	Decrease.
Cannel	13,464	19,704	.....	6,240
Gas	206,483	249,554	.....	43,071
Splint and Block	58,437	67,567	.....	9,130
New River, &c	282,142	270,236	11,906	.....
Coke	42,628	70,961	.....	28,333
Totals	603,154	678,022	11,906	86,774

Exhibit of Virginia at the World's Industrial and Cotton Centennial at New Orleans, La., 1884-5.—There is nothing of more importance to the material interests of Virginia at this time than the preparation of a full exhibit of her natural resources for the New Orleans Exposition. For this reason we feel warranted in using a large amount of our space this month in the presentation of matters pertaining to this great World's fair.

The following is the organization in Virginia for promoting her interests in that exhibition. If these gentlemen bestir themselves and are willing to spend and be spent for the interests of the state we can have one of the very best exhibits at New Orleans. If they are not it is probable we will make a meagre showing, or none at all, such as we have made at most of the great world's fairs in previous years. Let us hope for better things this time.

U. S. Commissioners.—James M. Blanton, Farmville, U. S Commissioner; J. B. Pace, Richmond, Alternate. Assistant U. S. Commissioners. in charge of Departments of Collective Exhibit; Randolph Harrison, Richmond, Agriculture, Horticulture etc.; Jed. Hotchkiss, Staunton, Mines, Ores, etc.; N. V. Randolph, Richmond, Manufactures, etc.; R. E. Blankenship, Richmond, Mills, Furnaces, etc., manufactures of; P. H. Mayo, Richmond, Tobacco; A. M. Bowman, Saltville, Live Stock, &c.

Virginia Board of Control.—The Governor, Wm. E. Cameron, Ex-officio, President; J. M. Blanton, Farmville; J. B. Pace, Randolph Harrison, L. Lottier, Richmond; H. C. Parsons, Natural Bridge; V. D. Groner, Norfolk; A. H. Drewry, Charles City Co.; C. R. Boyd, Wytheville. Wm. W. Finney, Richmond, Secretary.

Executive Committee of Board of Control.—Gov. Wm. E. Cameron, U. S. Comm'rs J. M. Blanton and J. B. Pace, and Asst. U. S. Comm'r Randolph Harrison. Wm. W. Finney, Secretary; Office at Agr. Dept. of Va., Richmond, Va.

Agents for collecting and receiving Exhibits.—Richmond, Thomas Christian; Petersburg, Dr. D. M. Brown; Danville, W. T Sutherlin; Lynchburg, Peter J. Otey; Norfolk, John L. Roper; Charlottesville, R. T. W. Duke; Staunton, W. A. Burke; Lexington, W. H. Barclay; Roanoke, Joseph H. Sands; Winchester, F. W. M. Holliday; Alexandria, Herbert Bryant; Abingdon, Walker Armistead; Fredericksburg, Joseph Scott; Cripple Creek District, Andrew Porter—postoffice, Speedwell; Jeffersonville, W. W. Peery. Principal Depots—Richmond, Danville, Staunton, Bristol and Roanoke.

Department IV.—*Ores, Mines, &c.;* Jed. Hotchkiss, Staunton, Va., Asst. U. S Comm'r in charge.

The following list embraces, in a general way, the exhibits desired in this department:

Class I—*Ores and Minerals.*—This exhibit should embrace a complete collection of minerals, represented by hand specimens rather than massive pieces, except where the latter are solicited. (If every owner of these would send what is choicest in his collection, the whole would make up a very interesting display.) *Each separate specimen should be labeled with name and address of owner, a full description of the deposit, its exact location, etc., and if possible, with a quantitative and qualitative analysis.*

Class II.—*Physical Features of State*, including topography, climatology, &c., should be presented by models, charts and tables, photographic views of mines, quarries, furnaces, prominent places and so on.

Class III.—*Building Stones* should be shown in blocks and slabs; granite, sandstones and limestones in one-foot cubes, having each side different from the rest—one broken, one bushed, one hammer dressed and one polished. Marbles, soapstones and slates are better cut in slabs.

Class IV.—*Other Minerals*—Asbestos, kaolin, mica, heavy spar, corundum, graphite, manganese, glass-sand, limestone for lime, fire-clay, millstone, grindstone, whetstone, ochres, &c., should be shown in ten pound pieces.

Class V.—*Ore in all stages of manufacture*, with models, diagrams, drawings and photographs of machinery employed, tables showing production, &c.

Class VI.—*Coal, Coke, &c*—Specimens of this character should be in large but not unwieldly cubical blocks, and should be accompanied by analyses.

Class VII.—*Marls, Phosphates* and the like, should be shown in glass (from one to two quarts), and be accompanied by analyses if possible. These may be sent in packages, but will be put in glass for exhibition.

Class VIII.—*Mineral Waters*—Specimens from all Virginia Summer Resorts and other places, accompanied by analyses, views of springs, samples of the rocks from which they flow, &c., &c.

☞ By appointment of the Virginia Board of Control, I have taken charge of the collection of an exhibit of the mineral wealth of Virginia, without compensation, for the sole purpose of having our state fairly and properly represented in this great World's Exposition. That I may be enabled to do this, I appeal to all persons in any way interested in the development of Virginia's mineral resources to aid me by collecting and sending to me, *without delay*, to the depots above named, as most convenient, in care of the agents named at those depots, the very best specimens they can procure of any articles named above or that properly belong to department IV.

Securely wrap each specimen by itself and wrap with each a label telling what it is, who sent it, exactly where it came from, how much there is of it, what is now or will be made of it, who owns it, any analysis there is of it and by whom made—in short, let the label tell all you know about it,—then put all together in a box or bundle, address it to me plainly and pay freight on it to the depot to which you send it. (The Board of Control will pay the freight thence to to New Orleans.)—Some railways, as the Chesapeake & Ohio, and the Richmond & Alleghany, have already agreed to send me all specimens to the depots named reached by them, free of cost. I presume the other roads of the state will do likewise.

Send me, to Staunton, Va., a list of all the specimens sent to the depot, giving me the same information put on the labels, so I can prepare a catalogue, labels for exhibition, &c., &c. Number each of your specimens on the labels and put the same number plainly on the outside of each separate package and number them the same way on the list you send me.

I shall not be satisfied unless I have something from each of the 100 counties of Virginia. Correspondence is invited.

Jed. Hotchkiss,
Asst. U. S. Comm'r.

The great interests of West Virginia.—Robert P. Porter, a staff correspondent of the Philadelphia Press, writes a letter from Wheeling to his paper, in which occurs the following:

West Virginia, with a population of nearly three-quarters of a million, is essentially a protective state. Its agricultural, mining and manufacturing interests are important, and in the course of their development the people have learned something of the benefits of a protective tariff. Scattered over the state are 31,000 flock-masters, and each of these wool-growers understands the benefits of the duty on wool. The blast furnaces of the state turn out annually nearly 100,000 tons of pig iron: the nail works 1,500,000 kegs of nails; its mines are rich with iron ore and its coal fields, as the following table indicates, have of late years developed rapidly:

Year.	Coal Tons.	Year.	Coal Tons.
1869	608,878	1880	1,400,000
1876	800,000	1881	1,500,000
1877	1,000,000	1882	1,625,000
1878	1,000,000	1883	2,000,000
1979	1,250,000		

While Ohio country is the great seat of the diversified industries of the state. iron manufacturing and machine shops may be found in Berkeley, Wood, Marion, Cabell and Harrison counties; iron and steel establishments in Marshall, Mason, Preston, Fayette and Taylor. Woolen mills have been established in Brooke, Kanawha, Monroe, Taylor, and Tyler counties. Glass, earthenware, bricks, nails, paper, and a score of other important industries have been successfully established in West Virginia. Below we have the aggregated importance of this manufacturing in 1880, the census year; since then a remarkable increase has taken place, as illustrated in the coal statistics already given:

Number of establishments	2,375
Number of hands employed	14,311
Capital invested	$13,883,390
Paid in wages	4,313,965
Value of material	14,027,388
Value of product	12,867,126

Every West Virginian knows that manufacturing and mining in this state is but in its infancy. They know that out of the 58,550 square miles of the great Apalachian coal field West Virginia possesses 16,000 square miles, while Pennsylvania has but 12,000 and Ohio but 10,000 square miles. Possessing, as she does, 28 per cent of the most important coal region of the American continent, there is no reason, if manufacturing continues, to suppose that the increase in the coal product will not continue, and that the mines of West Virginia will not soon supply a much larger proportion of the annual coal product than she now does.

Wheeling is every year becoming a more important centre of industrial energy. It has over 30,000 inhabitants, a large proportion of which number are engaged in manufacturing. The advantages of Wheeling as a manufacturing centre are many. Coal crops out in abundance from the surrounding hills; the Ohio river and Wheeling creek furnish water in abundance, and the river and excelent railroad connections give easy and cheap access to all parts of the country. Iron, glass, earthenware, woolen goods, cigars and tobacco are manufactured here. Thirty or forty million cigars are annually turned out in Wheeling and the immediate neighborhood, The window glass industry was begun as far back as 1820.

The city is also famous for its cut nails. The growth of the business is largely due to the cheap coal. The iron out of which these nails are made is produced on the spot. During the years 1871, 1872 and 1873 the mills of Wheeling produced 2,995,500 kegs of nails—nearly one-fourth of all the nails then made in the United States.

Ferro-manganese from Virginia ores.—In the Sept. 5, 1884, issue of the "American Manufacturer" of Pittsburg, Pa., one of the most catholic and sensible of the trade papers of the U. S., we find the following:—"During the past 2 or 3 weeks Blast-furnace A of the Edgar Thompson Steel-works has been producing ferro-manganese instead of spiegeleisen, as formerly. On Monday last we were shown a specimen of this ferro-manganese which contained a small fraction over 92 per cent of manganese. The ore is obtained from the Crimora mine, in Augusta county, Va., which is leased by James B. White & Co. of this city. The mine is 3 miles from Crimora station, Shenandoah Valley RR. The quantity of ore raised during August was 1,000 tons. The company has sunk a new shaft which is 140 feet deep and will be furnished with modern hoisting apparatus. The old shaft is 130 feet deep and the ore is raised by means of buckets.

The following is an analysis of this ore made by Andrew S. McCreath of the Pa. Geol. Survey:

Manganese binoxide	81.703	Sulphuric acid	none
" protoxide	7.281	Phosphoric "	0.171
Iron sesquioxide	0.553	Alkalies	0.467
Cobalt oxide	0.354	Water	3.405
Nickel "	0.086	Silica	2.132
Zinc "	0.623		
Copper "	none		100.000
Alumina	0.896		
Baryta	0.829	Manganese, metalic	57.291
Lime	0.880	Iron "	0.373
Magnesia	0.630	Phosphorus	0.075

The company has been shiping its ore to England for 2 years or more, and now ships to Belgium. It commenced shiping to the Cambria Iron Co., Pa., about 18 months ago and has been shiping to Pittsburg about a year. Besides supplying their own steel plant (the Edgar Thompson) with ferro-managnese, Carnegie Bros. & Co., Limited, are also supplying some of the open-hearth furnaces hereabouts. With one exception, we believe that Furnace A is the only blast-furnace in the U. S. that has made ferro-manganese. The exception is Diamond furnace, in Georgia, which a few years ago made ferro-manganese, but according to our recollection the product was not near so rich in manganese as that made at the Pittsburg furnace."

Norfolk & Western RR.—A circular of the accurate and efficient Comptroler of this Company, Mr. Wm. G. Macdowell, informs us that its net July, 1884, earnings were $76,323 against $96,972 for July, 1883; a decrease of 21 per cent. For the 7 months from Jan. 1 to July 31, 1884, the net earnings were $535,072 against $598,909 for the same period of 1883; a decrease of 11 per cent.

The causes which led to the decrease in gross earnings for the month of June, as compared with the same period of last year, as mentioned in the June statement of earnings and expenses, prevailed also during the month of July.

The result of the means adopted for the reduction of expenses is shown above, and will be correspondingly apparent during the succeeding months of the year.

Although the movement of the large crops of the present year is still impeded by the low prices at present prevailing, the volume of business for the current month compares favorably with that of the same period of last year, as is shown by the reports of estimated earnings so far received.

Altitudes and distances from Fredericksburg to Rawley Springs, Va.—The following elevations above mean tide in Rappahannock river at Fredericksburg, Va., and distances, are from a survey for a railway made in 1876 by Col. Carter M. Braxton; on part of this line was subsequently constructed the present Potomac, Fredericksburg & Piedmont RR., from Fredericksburg to Orange:

	Miles.	Ft. a. m. t.
Rappahannock river	0.00	00
Fredericksburg	0.19	40
Mine road, 1st summit	5.70	255
Mattapony river	8.37	227
Catharpen road	9.85	320
Ny river, surface	11.20	233
Brock road	13.26	276
Poplar neck	13.83	317
Wilderness summit	15.15	395
Ivy branch	15.53	365
Parker's store	17.55	405
North fork, surface	18.70	352
New Hope station	21.02	479
Richmond road	25.09	460
Verdiersville station	26.70	495
Verdiersville	26.70	520
Marquis road	27.50	490
Pamunkey-Rapid-Anne divide	27.50	490
Unionville	29.92	485
Blue run	36.61	423
Orange C. H.	38.00	515
Summit	38.62	566
Montpellier	42 00	500
Blue-run valley	44.26	430
Somerset	45.09	430
Summit	46.09	450
Marsh run	47.00	378
Divide	47.77	402
Church run	48.24	390
Ruckersville	54.57	670
Summit	56.00	706
Stanardsville	60.53	670
Swift Run gap, Blue Ridge	72.92	2,355
Roadside, w. foot Blue Ridge	86.61	979
Shenandoah river, near Elkton	87.91	898
McGaheysville	93.80	1,160
Keezletown	99.34	1,180
Chestnut ridge	101.55	1,450
Harrisonburg, S. W. end	105.70	1,266
Dry river near Rawley Springs	116.71	1,202
Briery branch gap	121.02	1,584
Rawley Springs	119.81	1,564

The Limestones and Marbles of the Virginias.—In the elegant volume of S. M. Burnham on the History and Uses of Limestones and Marbles, recently issued by S. E. Cassino & Co., of Boston, we find the following:

The oldest rocks in Virginia are the Eozoic, found in the Blue Ridge, extending to Richmond, and in West Virginia; but the great valley between the Blue Ridge and the Alleghany develops on a grand scale, Paleozoic strata largely calcareous, including limestone, dolomite, gypsum, and shale. The Niagara formation, one of the most widely-diffused on the continent, is in this region, 1,500 feet thick.

The carboniferous limestones increase in extent towards the southwest, reaching to Alabama and Mississippi. The Chester limestone of the Sub-carboniferous period, and some thin beds of Carboniferous among the Coal measures, are developed in West Virginia, but the largest display of Paleozic limestones are seen on the Ohio river. An important limestone occurs on the Potomac, which, in extending towards the west, gains in thickness from 80 to 800 feet.

The Cretaceous rocks of the Atlantic border cross the Potomac and are seen extending towards the south for some distance, when they are lost to view, but they reappear with a small development in North and South Carolina.

On the upper course of the Potomac, limestone cliffs of great height form a marked feature of the landscape.

The Tertiary of Virginia occupies a wide area on the Atlantic, and is remarkable for accumulations of fossil remains. Besides the Infusorial beds, in some places thirty feet in thickness, there are other deposits consisting almost entirely of fossil shells. A series of these beds enclosing the Pecten, Ostrea, Chama, and Venus, some of large size, occur at one locality on the James river, and more are found in other places. These aggregations of the flora and fauna of the Tertiary period in this state, afford interesting studies for the paleontologist.

The Virginia limestones, comprehending, according to W. B. Rogers, nearly forty varieties, yield many different marbles, some of which are fossiliferous. A white marble, shaded with pink and sometimes green, is obtained from a talcose limestone, and a granular, sparry variety of blue and gray, tinted with rose, is found on the Rapid-Anne. A very delicate salmon-colored marble, and another of a dark slate color may be added to the list of Virginia marbles.

The Louisville, New Orleans & Texas RR., the extension from Memphis to New Orleans of the Chesapeake, Ohio & Southwestern RR., a part of the Chesapeake & Ohio system, was completed the 8th instant, and through trains from Memphis to New Orleans will be runing over it by the last of this month. *The Kentucky Central* of this same system was opened to traffic, from Cincinnati to Knoxville, Tenn., the first of this month, thus opening a new direct line to the middle and eastern portions of the South.

Thus steadily and surely, but quietly, is this great railway system extending strong arms northward and southward from the great continental spinal cord of trade and travel that the genius of President Huntington has extended from the grand harbor of Virginia to that of California, so it can draw to that main line, from all the chief centres of southern, southwestern, and western production and activity, to swell the vast volume of business that naturally and rightfully belongs to its location and terminal advantages.

The Coal and Coke traffic of Ches. & Ohio Ry., for July, 1883 and July, 1884, are shown in the following table, compiled for *The Virginias*, from official returns, by J. W. Hopkins the fuel agent of this railway.

Kind.	1884.	1883.	Increase.	Decrease.
Cannel	3,046	3,167	....	121
Gas	26,492	34,908	.....	8,416
Splint and block	7,773	6,433	.....	.....
New River, &c	34,526	30,966	1,340	.....
Coke	6,317	7,913	3,560	1,596
Totals	78,154	83,387	4,900	10,133

The distribution of the above was as follows:

		1884.	1883.
1.	To Ches. & Ohio Co. for its own use	18,404	21,342
2.	To Huntington, for West via. Ohio river	97	3,400
3.	On Elizabethtown, Lex. & Big Sandy RR.	3,706	1,141
4.	On Ches. & Ohio RR., excepting Richmond	13,407	13,555
5.	To Rich. & Alleghany RR. at Clifton Forge	603	385
6.	To Valley RR. of Baltimore & Ohio at Staunton,	....	.....
7.	To Shenandoah Valley RR. at Waynesboro	....	.....
8.	To Va. Midland at Charlottesville	2,060	2,166
9.	To Rich. Fred. & Potomac RR., at Junction	53	88
10.	To Richm'd for consumption, includ'g tugs, &c,	5,378	6,496
11.	To James River wharves for shipment	12,164	12,296
12.	To Newport News, For consumption, &c	773	352
	To Newport News, For shipment	21,489	22,321
	Totals	78,154	83,387

The movement from January 1st, 1884, to July 31th, 1884 inclusive, and for same time in 1883, was as follows:

	1884.	1883.	Increase.	Decrease.
Cannel	9,776	17,935	.....	8,159
Gas	182,087	229,019	.....	46,932
Splint and Block	46,601	57,896	.....	11,295
New River, &c	255,190	239,784	15,406	.....
Coke	34,449	63,960	.....	29,511
Totals	528,103	608,594	15,406	95,897

Geology of the Blue Ridge in James River Gap, Va.

Written for *The Virginias.*

A paper on the geology of the Blue Ridge at Balcony Falls, Rockbridge county, Va., appeared in the "American Journal of Science," December 1879, illustrated with maps and geological sections. The same paper was revised by me for *The Virginias*, and was published in the issue for June, 1880. The facts there presented are correct in most respects—at least as far as the paper relates to the Cambrian rocks that rest against the N. W. side of the igneous and metamorphic core of the Blue Ridge at this point. But as regards the stratified beds flanking the main ridge on its S. E. slope, subsequent observations have modified the views expressed in the following paragraph found on page 87 of *The Virginias:*

"The beded rocks (1, a, b,) that rest upon the syenite are very much metamorphosed, are gneissoid in character, and dip towards the southeast. [So far correct.] Then follows a bed of 40 or 50 feet of conglomerate and quartzite, bearing some resemblance to the conglomerate sandstones on the opposite side of the Ridge, but so unlike in texture, position and thickness as to preclude the idea that they have any historical connection. Over this again we find another bed of slate. These beds all dip towards the S. E., while their upper margins reach beyond the underlying syenite and granulite, and with their upturned edges support the lowest beds of the Primordial rocks, where they extend high up on the ridges beyond the limit of the igneous beds. The two series, here and at other points along the Ridge are unconformable. Such are the Archaean rocks."

Prof. Wm. B. Rogers, in his notes on the geology of Virginia prepared for Macfarlane's Geological Railway Guide, puts all the rocks along James river from Lynchburg to Balcony Falls under the Laurentian and Huronian (his A. and B.) divisions. But I had not seen those notes before the foregoing paragraph was published, and am, therefore, personally responsible for a mistake in my conclusions as to the higher slates and sandstones along the southeastern flank of the mountain.

My assistant, Mr. Harry D. Campbell, and myself were recently called upon to make a professional survey of a valuable slate belt at the S. E. base of the Blue Ridge, in the western corner of Amherst county. We found it crossing James river a short distance below where the map and geological section above refered to terminate. In this belt the "Snowdon slate quarries" are now worked.

While engaged in our examinations of the geological relations of this slate belt, my assistant discovered that a bed of sandstone diping beneath the slate abounded at some points in the fossil borings of the *Scolithus linearis;* while still nearer the base of the mountain, and lower geologically, he found a ledge of quartzite closely resembling the "Balcony rock," as it crops out at the falls.

Examinations were then extended down the river, which here cuts the ledges approximately at right angles to their strike, and separates the counties of Amherst and Bedford. We found the structure the same both sides, but most distinctly defined along the right bank, or on the Bedford side. Several alternations of sandstones and slates are disclosed, all diping towards the southeast, but with decreasing steepness, until, at a point a little way above the old ferry, where the Richmond & Alleghany Ry. now crosses the river, they become approximately horizontal; then, changing their dip towards the northwest, with gradually increasing steepness, a similar succession is repeated, until at a distance of one and a half or two miles below the railway bridge the lowest bed was found to be underlaid by Archaean rock, like those which form the core of the main mountain. Thus we have what is, to all appearance, a comparatively shallow syncline about two miles wide, occupied by several successive beds of conglomerates, sandstones and slates, bearing a resemblance in many respects to the lower beds of the Cambrian formation on the N. W. slope of the main mountain, but much modified by metamorphic agencies

I acknowledge that, without having made a very close examination, I formerly regarded this little synclinal valley as of Huronian age, and pointed it out as such to Prof. C. H. Hitchcock, when we were passing it some two years since on the R. & A. Ry.; but the subsequent discovery of a bed of sandstone, as one of its geological constituents, bearing numerous characteristic scolithus borings, has determined it to be of lower Cambrian age.

In confirmation of our conclusions, Mr. H. D. Campbell has traced the scolithus bed, with its accompanying conglomerate bed, for five miles or more on each side of the river.

Along the Amherst side, the higher beds of slates and sandstones—including the main scolithus bed—seem to have been carried away by denuding agencies for some considerable distance from the margin of the stream. But on the Bedford side my assistant found what evidently answers to the "Balcony rock"—the lowest quartzite of the series—well exposed. There after passing an overlying bed of slate, he found the same scolithus bed which he had discovered on the other side of the river. Again, in his continued explorations, he found some of the peaks, a little remote from the river, caped with still higher beds—including at some points the upper or typical scolithus bed, the true Potsdam sandstone.

It thus appears that we have a considerable belt of the lower Cambrian broken off and left on the southeast side when the axis of the Blue Ridge was upheaved. Researches on this and other belts farther east will claim our special attention at a future time, but I have said enough for my present purpose, and shall turn the further discussion of this interesting problem over to the hands of my associate for a broader as well as a more detailed treatment.

John L. Campbell

Washington & Lee University,
Lexington, Va., Aug , 1884.

The Old Dominion Coal Co's Lands.—Mr. P. W. Sheafer, engineer of mines and geologist, of Pottsville, Pa., sends us the following report under date of May 27, 1884:

Location.—This property, containing 1,322 acres, is situated in Kanawha county, West Virginia, near Dego station, of Chesapeake & Ohio Railway, 346 miles west of Richmond, and 23 miles east of Charleston. It has a frontage of nearly one mile on the Kanawha river, and is traversed for the same distance by the Chesapeake & Ohio Railway.

Topography, etc.—As will be seen by refering to the accompanying map, the tract covers the hills immediately between the river and Paint creek, whose branches cut deeply into it on the western side, and afford easy access to the coal and timber throughout its whole extent. The summits, some 900 feet above the river, are flat, generally formed by strata of massive sandstone, while the slopes are steep, and often a succession of cliffs separated by intervals of gentler descent.

The property is well timbered with oak, poplar, beech, hickory and other woods, which can be easily carried to river, railroad or mines.

The Paint Creek Narrow-guage railroad runs up the west bank of the creek, while the grading of the old Paint Creek broad-gauge railroad on the east bank, still remains intact where it passes through this estate. If, as is now proposed,

this road is rebuilt, it will tap all the coal territory between Thoroughfare and Sugar Camp branches.

Geology.—This tract lies in the centre of the Great Kanawha coal basin, which is the southern extension of the celebrated coal deposits which cover western Pennsylvania and Maryland. The coals which cover this portion of the field are those of the Lower productive measures of Rogers' Pa. survey, or those included between the top of the Great conglomerate and the Lower barren measures. The coals here are greater in number and in thickness than is usual in these measures, consisting of from twelve to fourteen beds (according to Prof. D. T. Ansted's observations) averaging 50 feet in total thickness. The individual beds vary from 2 feet 6 inches to 11 feet in thickness, a large number of them, however, being of workable size, ranging from 4 to 7 feet.

The general dip of the measures here is gently to the northwest, averaging, from the falls of the Kanawha to the Ohio, 50 feet to the mile. There are, however, local rolls, which make the coals in this vicinity nearly flat.

Character of the Coals.—The coals of the Kanawha region comprise the cannel, splint, gas and coking varieties, and have a well established reputation throughout both the East and the West. The cannel has an excelent record as a gas-producer, brings a high price in the eastern markets, and is always in demand.

The splints are remarkably firm, free from impurities, and are used with great success in the manufacture of iron in West Virginia, Kentucky and Ohio. They also are a favorite domestic coal. The gas coals are of superior quality, and are used for making illuminating gas in Washington, Philadelphia, New York, Brooklyn, New Haven, Boston, and other eastern cities, and compete with the celebrated gas coals of western Pennsylvania.

The manufacture of coke in West Virginia is mainly confined to the New River region, but there are several points in the Kanawha district where a superior coke is made, and there is no doubt but that the production here will increase.

Analyses.—The following analyses of Kanawha coals will show the general composition of the beds which are found in the vicinity of this tract:

Creeks.	Carbon.	Vol. matter.	Ash.	Coke.	Sulphur.
1. Kelley	60.92	37.08	2 00	. .	. .
2. Kelley	74.55	21.13	4.32	. .	. .
3. Coal	55.55	41.85	2.60	. .	. .
4. Campbell	64.16	32.24	3.60	. .	. .
5. Cabin (1)	56.42	38.09	4.15	60.57	1.68
6. Cabin (2)	57.17	38.92	2.98	60.10	.80
7. Cabin (3)	58.19	37.65	1.88	60.07	.70

Nos. 1 to 4 are from Wm. B. Rogers' reports, Nos. 5 to 7 from Mineral Resources U. S., 1883.

The accompanying table shows the results of some of the tests made by the Richmond Gas Works in 1874:

W. Va. Coals.	Lbs. used.	Yield per lb.,cu. ft.	Yield per ton.cu.ft.	Candle power.
Coal Valley,	40,810	4.10	9,206	14.50
Coalburg,	28,000	3.78	8,467	13.90
Cannelton,	24,000	3.97	8,892	13.90

Section openings.—Although but five beds were examined on this property, yet there is no doubt but that all of the beds of the Lower productive measures exist in the hillsides, and they could be exposed to the view, if necessary, by a series of systematic proving holes. There is not the slightest doubt but that the coals worked at Coalburg, Blacksburg, Crown Hill, Coal Valley, Armstrong Creek, and many other points east and west, are here present.

The following section, measured with an aneroid barometer, shows the relative position of such beds as were examined:

	Above C. & O.	
Massive sandstone	900′	
Coal crop,	780′	
Black slate,	610′	
Black flint,	550′	
Old Dominion coal,	500′	7′ 6″ thick.
Splint Coal	460′	4′ 0″ "
Coal	420′	3′ 6″ "
Sandstone	.....	.....
Sandstone	.....	.....
Coal (?)	.....	.....
Coal	60′	3′ to 4′
C. & O. Ry	0′	

The lowest bed of the section is opened on the roadside 50′ above the railroad at Dego station, and shows about 3 feet of splinty coal. Apparently this same bed crops in the wagon road further east, near Hansford branch on this property, and there measures 4 feet.

Some 350′ above this bed a crop measuring 3′ 6″ has been opened, and, although the coal has but a foot or two of covering, it is hard and bright and seems to be of good quality; 60′ higher and a short distance east of the Old Dominion mine, is a drift driven in on the coal 60′, on a bed of hard, clear, splint coal, 4′ thick. The coal appears to be free from sulphur, and mines in large firm blocks, well suited to stand transportation. Immediately on top of the coal is 3′ of fire-clay rock which can easily be removed so as to give sufficient head room for mules in the main entries.

The bed worked in the Old Dominion mine is 35′ above the 4′ seam, or some 500′ above the railroad. The bed measures:

Splint Coal, ...	5′ 2″
Slate	0′ 3″
Coal (bottom)	2′ 0′
Total, ...	7′ 5″

The bed in some parts of the mine is said to increase to 8′ in thickness. The top bench is a bright faty splint coal, firm and solid, The bottom bench, where examined, is a mixture of splint and bituminous coals. The roof of the bed is a firm slate which seldom requires much timbering. At the time of this examination it was impracticable to enter the mine for any distance on account of the condition of the main entry, but, from all that could be learned, the rooms and cross entries are in very good condition, even after having been abandoned for more than 25 years.

The mine was opened in 1854, and preparations were made to ship coal down the river, but so much difficulty was encountered in floating barges over the shoals of the then unimproved river, that it was abandoned in 1857, after having produced but little coal.

The coal was carried direct to the river from the mine mouth, over a self-acting plane, the grading of which still remains comparatively unharmed. This mine could at a little time and expense, be placed in shiping order, and worked in connection with the underlying 4′ of splint, would furnish for many years an abundant supply of coal to warrant a large operation.

This Old Dominion bed has been opened at the crop to the west of the mine in two places, measuring respectively, 7′ 4″, and 7″ 8″ of good coal. To the east, this bed and the 4′ beneath have been traced to the east line of the estate. This seam is considered to be identical with the bed worked at the Coalburg mines, six miles down the river.

The drift on the 4′ bed mentioned above, was opened at the same time as the Old Dominion mine, and was connected with it by a graded road, upon which, however, neither sills nor rails were laid.

The hills rise 350′ to 400′ above the mine, and show a suc-

cession of sandstone ledges separated by intervals of softer rocks, in one of which, at an elevation of 780′ above the railroad, a crop of a coal bed was noticed.

Although no cannel coal has been opened on this estate, yet it seems probable that at least the southern portion contains a seam carrying a cannel bench, since the old Paint Creek Coal Co., worked on the adjoining property and near the south line of this tract a bed 11′ 4″ thick, including 2′ 6″ of cannel.

Quantity of Coal.—If, as Prof. Ansted and others estimate, the total thickness of coal in this vicinity, is on an average, 50′, the quantity contained in this tract is very great. Allowing but 1,000 of the 1,322 acres to be underlaid by the thickness of coal, the contents would be in round numbers, 80,000,000 tons. This total however, does not represent the quantity of available coal, since the 50′ of thickness includes several beds which are less than 3′ in height, and consequently at present unworkable. Probably two thirds this thickness is contained in beds which can be mined, and which for the above area would hold 50,000,000 tons.

Considering only the three beds opened in the vicinity of the Old Dominon mine, the yield per acre of each bed should at least be 5,000, 4,000 and 3,600 tons respectively, or a total of 12,600 tons. Estimating roughly, allowing for crop coal, waste in mining and other contingencies, each acre should produce 1,000 tons per foot of thickness of the coal. From these figures it is readily seen that the territory which can be worked from the river front, will supply for many years, the coal necessary to fill the demands of an extensive trade.

Mining, etc.—This estate is very desirably situated in regard to the economical mining of the coals, since the beds on the river front can be worked by drifts, and the output carried direct to railroad or river over a self-acting plane of about 1,000′ in length. The openings can be so located as to drain themselves, thus avoiding any machinery or apparatus for drawing off the water, which at times may accumulate in the faces of the rooms and entries. The mines of this region as a usual thing, are but little troubled with water, and consequently the question of drainage is comparatively unimportant.

No trouble is experienced with noxious gases, and artificial ventilation whenever required, can be obtained by the use of furnaces.

Several of the beds are of such size, and the character of their roofs so good, that but little timbering is required—which fact tends to reduce materially the cost of mining—and, but in a few instances is it necessary to make head room in the entries.

At present, miners are paid from 2 to 3 cents per bushel, varying with thickness of the bed, character of the coal, kind of roof, and other local conditions. A fair miner can cut 100 bushels daily. The total cost on board the cars at the railway, or in barges on the river, on account of cheap mining and short and direct haul from the mines, should compare favorably with the cost at any other mine on the river, and in many instances would be considerably less.

Thoroughfare and Sugar Camp branches of Paint creek, afford access to the coals which cannot be worked from the river front, while the large area of open ground near the mouth of the former branch, is well suited for the location of miners' houses, shutes, ovens and other necessary buildings.

The river front of this tract is deep, and will furnish an unexceptionally good loading place.

Navigation on the river is now open during almost the entire year, and the cost of delivering the coal at points on the Ohio and Mississippi, is so reasonable, as to give *the Great Kanawha coals an important advantage over the competing Pittsburg coal.*

Outlets, Markets.—The natural outlet of this region, is the Kanawha river, which emptying into the Ohio, some 75 miles west of this property, opens to these coals the markets of the great Mississippi valley with its rapidly increasing population and industries.

The Government dams and improvements already completed have made river transportation almost a certainty during the entire year.

This estate is 237 miles nearer Cincinnati, Louisville and other Western cities, than Pittsburg.

The Chesapeake and Ohio Railway furnishes the outlet by which the Kanawha coals reach Richmond, tidewater and the cities of the Middle and Eastern States

The distance by rail to Richmond is 346 miles, to Newport News, 421; to Huntington on the Ohio 75 miles and to Lexington, Ky., 213 miles.

Recapitulation.—This property is especialy valuable and desirable for the following reasons:

1. It is located in the heart of a region having a daily capacity of 7,000 tons of coal of a well established reputation.
2. It is a compact body of land, fronting on a navigable river, with such topographical features as to render all parts easily accessible and to make transportation from the mines cheap.
3. The presence of valuable beds of coal, bituminous and splint, of excelent quality, all above water level, and of such thickness and character as tend to make mining profitable.
4. Railway communication both east and west.
5. It is nearly 240 miles nearer the Western cities than Pittsburg, the chief competitor of this region.

In conclusion I would say that this tract posesses all the essential elements for the location of successful mining operations, and its advantages are such that I have no hesitancy in recommending it as a property of ever increasing value.

The New Orleans Exposition.—There seems to be abroad a confusion of ideas as to the duties of the State Commissioners appointed by the President of the U. S. to represent the respective states in the "World's Industrial and Cotton Centennial Exposition," at New Orleans, and in reference to the expenditure of the funds entrusted to these commissioners: to make these matters clear we publish the following circulars, from the Chief of Installation and the Director-General of the Exposition, that have been sent us by Dr. J. M. Blanton of Farmville, Va., the U. S. Commissioner for Virginia:

1. *Circular No. 5*, dated April 8th, 1884:

"For the purpose of facilitating the work of installation in the Main Building of the Exposition, it is announced for the information of exhibitors, that collective exhibits, within the meaning of the general regulations issued August 15th, 1883, should be constituted as follows, viz:

1. Collective state, county or parish, district or municipal exhibits for location in the Main Building, may comprise collections of natural resources, such as

Illustrations, models, actual or prepared specimens of animals, birds, fishes, insects, etc.

Geological specimens, fossils, petrifactions, shells, etc.

Prehistoric relics, antiquities and curiosities.

Minerals and ores.

Specimens of soils from the various geological formations of the section represented, with analyses.

Specimens of waters and mineral waters of the section represented, with analyses.

Grasses, fibres, mosses, etc.

Specimens of native woods in convenient form.

Products of forestry direct.

Agricultural products of every description, fruits, natural, dried or preserved.

Manufactured food products, and textile fabrics peculiar to the section represented.

Geological, botanical, entomological and ornithological collections from the section represented, properly classed and designated.

Collections may be composed of actual or prepared specimens, or of illustrations, in photographs, or prints, or models of papier-mache, or other material, and may embrace official maps, charts, reports, etc.

2. Individual or associated collective exhibits, for location in the Main Building, may comprise collections of articles or products of a similar character, or such as may be installed in accordance with the grouping and classification already announced.

3. Collective exhibits for location in special structures provided by the exhibitors, outside of the Main Building, are not included in these definitions, and may be arranged as suits the exhibitor, after proper entry has been made.

4. The Department of Education and Instruction is intended to be a national and international exhibit in itself, and to this end, it is desired that all exhibits in this group shall, without losing their distinctive character, be installed in this department."

2. *Circular of Director-General E. A. Burke*, dated August 26, 1884, addressed to the State Commissioners:

"The appropriation made by the Board of Management is to aid in securing a collective exhibit of the natural resources of the respective states and territories.

In the manufacturing states the collective state exhibit can be rendered additionally attractive by securing models, diagrams, photographs of exteriors and interiors, with cuts of the machinery, of the crude material, of the material in process of manufacture, also cuts or views of the products of said machinery. It is also desirable to include charts showing the production and profits of manufactures, the wages of labor, skilled and unskilled, and the complete statistics of this subject properly arranged.

Entries for competition cannot be made by persons or firms in a collective state exhibit. State commissioners may, however, receive and display, in their collective exhibit, a sample of each manufacturing industry of their state, provided the same can be accommodated within the space allotted the respective states.

By this means manufacturers who may exhibit in competition in the respective classifications to which the rules assign them, will secure additional advertisement at slight expense, and the manufacturer who may not avail himself of the invitation to send his machinery to the exposition, can thus represent his machinery and its product.

Both classes will thereby contribute to the state exhibit and at the same time promote their own interests.

Commissioners may indicate the names and addresses of such contributors by card attached.

The expenditure of this appropriation should be confined to the expenses necessary in collecting, transporting, arranging and displaying a collective exhibit of the natural resources of the states and territories, as described in circular No. 5, and for such additions thereto as are above suggested.

This explanation is made to avoid misunderstandings as to the object of the appropriation and because many commissioners appear to regard the funds as applicable to expenses for advertising and for soliciting individual exhibits for the exposition.

It is expected that State Commissioners will give such information as may be sought from them by exhibitors when in their power, and generally do what they can to promote interest in the exposition, but the primary duty and responsibility upon them is to see that their state or territory is represented by a creditable collective state or territorial exhibit.

To aid them in the discharge of this duty the management cheerfully set aside the sum of $5000 for each state or territory, to be paid on the draft of the Governor in favor of the Commissioner, to be drawn whenever the work of preparing a collective state exhibit is actually in progress, in installments as advised by the Director-general.

In the meeting of commissioners at Washington, in May last, many commissioners desired separate buildings for headquarters for the people of their states or territories, and after conference it was agreed that the management would attach to the Government building for the United States and state exhibits, a pavillion or building with arrangements for a commissioner's office, reading room, etc., where the local papers of the states and territories can be placed on file, mail distributed and information imparted, without encroaching upon the space required for the state exhibit, and it was understood that $1000 would be reserved from the amount appropriated by the management for this purpose, unless the state commissioner should decide that he would prefer not to avail of the office and headquarter construction, in which event the same would be omited and the full $5000 paid in installments as stated.

It was understood, however, that such notice should be given to the Director-general by the 1st of June, in order that the construction of the building be changed to conform thereto.

The amount appropriated	$5000 00
Less for office and headquarters	1000.00
Net appropriation	4000.00
First installment, one-third	1333.33

Where notice has not been given to the Director-general that a collective state exhibit is in course of preparation, and the Governor has not, therefore, drawn for the proportion set aside for a state or territory, it will only be necessary for the Governor or State Commissioner to advise the Director-general that a collective state or territorial exhibit will be made, and authority to draw for the amount will be mailed or wired promptly.

It is the earnest desire of the management to see every state and territory of the Union represented at the World's Exposition, and they will be gratified to know that the states or territories that have not called for the funds set aside will exhibit, whereupon the amount now at their credit and other installments soon to be in hand will be promptly and cheerfully paid over."

3. *Circular No. 7 of the Department of Installation, Samuel Mullen, Chief*, dated August 27, 1884, respecting *Collective Exhibits:*

"For the information of state and territorial commissioners, and all persons engaged in the work of organizing Collective exhibits, the following detailed suggestions are submited to aid in carrying out the purposes of Circular No. 5, issued from this Department April 8th, 1884, and amended August 27th, 1884:

Minerals and Ores.

1. There should be a complete collection of all the characteristic minerals of the state represented by well selected hand-specimens. This should include all the gems and precious stones, crystals, rare minerals, hand-specimens of all the ores and rocks of the state. Every item of the mineralogy of the state, should be represented by a small specimen, at least, in this collection.

2. Geological specimens, fossils, and so on, sections, diagrams, engravings, and photographs should form another collection. All of the physical features of the state, includ-

ing its topography, climatology, and so on should be represented by a model, charts, and tables. This should include views of its characteristic mountains and valleys, cataracts, landscapes, &c. A collection of photographs of scenery can be made extremely interesfing and instructing.

3. There should be a collection of botanical preparations illustrating the flora of the state. Also a collection of growing plants, shrubs, and small trees, as far as possible, illustrating the climatic range and variations of species in forestry and horticulture.

4. The fishes of the state should be represented by specimens in alcohol, plaster casts, or other preparations, or by engravings. Give the statistics of your fisheries.

5. The animals of the state should be represented by stuffed specimens, mounted birds, insects, &c., with such accompanying specimens as will indicate their habits and mode of life. A collection of shells is easily made, and always interesting to the public.

6. The building stones should be exhibited in blocks or slabs. One-foot cubes, for example, are suitable for sandstones, granites, limestones, &c., while marbles, soapstones, and slates are better cut in slabs. It is suggested that different sides be dressed in different styles, say one side broken, one side bushed, one hammer-dressed, and one polished.

7. Minerals of economic value (not metalic ores), such as asbestos, kaolin, mica, heavy spar, corundum, graphite, manganese, glass-sand, limestone for lime, fire-clay, millstone, grindstone, and whetstone, ochres, etc., should form another class and be exhibited in large specimens of ten pounds or over.

8. Working specimens of the metalic ores should form another group, and be classified according to the metals which they produce. While the mineralogical collection (No. 1 of this list) presents the minerals in scientific order, this group with the two preceding groups and the two succeeding ones should present the minerals of the state from their industrial standpoint. Each different vein or different ore of a mine should be represented by a separate specimen. In this connection urge the preparation of collective exhibits, illustrating the metalurgic operations practiced in the states, embracing specimens of ores in all the stages of manufacture, of the products and by-products, models, diagrams of works, drawings, and photographs of machinery, tables showing production, etc. Specimens of coal, peat or other fuel should come in here, and all specimens of this character should by all means be accompanied by analyses.

9. Specimens of soils, taken to include surface to sub-soil, in glass tubes or boxes with glass fronts. Marls, phosphates, etc., all accompanied by analyses.

Forestry Collection.

11. Commissioners are requested to use the numbering and nomenclature of Prof Sargent's catalogue of "The Forest Trees of America," published as a portion of the report of the 10th Census, in naming and arranging their specimens of woods and timbers. His new scientific nomenclature had best be used for uniformity, and these names with the common and local names and the locality should be put upon the labels. The following collections are suggested to illustrate the woods and timbers:

12. Logs cut from the trunk of the tree one foot above the ground, and four feet long At the upper end they are sawn longitudinally through the heart 15 inches, and the blocks thus formed removed upon one side by a cut slightly beveled. The sawn surfaces are then planed and sand papered. Give in your catalogue the diamater of these blocks at the upper end, that is five feet from the ground. Of trees too large to be thus handled, cut a disc one and a half foot thick five feet from the ground.

13. Planks two inches thick, and two feet long, cut from bark to bark through the heart, or in case of very large trees from heart to bark, should be well seasoned, dressed, sand papered, and polished, by rubing with a solution of white shellac and alcohol until a glossy but colorless surface is obtained.

14. Knots and burls for veneers, ornamental woods, turned or carved specimens, varnished specimens to show their appearance in furniture, will form another class.

15. Spoke, handle, rim, bucket, and barrel timber, hoops, and every kind of half-manufactured wood form another class.

16. Forest products, barks, medicinal and for taning, wild fruits, rosin, and gums, medicinal herbs and roots, form another class.

Horticulture.

17. It is not necessary to go into the classification, as this is provided already in the premium list of the Department of Horticulture. To the suggestion on page 9 of this publication the following points are added: Specimens of small fruits, and of all fruits of the *prunus* and *pirus* species, and of garden vegetables, can be well preserved in alcohol of a proper strength, in clear glass show bottles. Quart sizes are best for the small fruits, half gallon for the larger fruits. For recipe apply to Commissioner A. J. McWhirter, Nashville, Tennessee. Dry, evaporated, caned, and conserved fruit should also be exhibited. Fruit products, jellies, wines, brandies and vinegar should not be omited. Tropical and semi-tropical, and possibly other fruit, should be renewed frequently during the exhibition.

18. Horticulturists are recommended to avail themselves of the superior cold-storage arrangements which are offered by the management. Fruits should be shiped at the period of their best condition for transportation, and kept in New Orleans in cold storage until wanted for exhibition purposes.

19. The appointment of a horticultural week is suggested, suited to each climatic belt, to be designated by the management, for the fullest display of fruits and vegetables in their most perfect condition. Collections of fruits, flowers, and leaves in wax should supplement the fresh fruits, where they fail.

Agriculture

20. The small grains should be exhibited, threshed and in the sheaf. Corned shelled, in the ear and in the shuck, grasses, wild and tame, in bales and sheaves. Pull the grasses up by the roots.

21. Forestry, farm, and garden seeds in glass show bottles.

22. Collective exhibits, showing all the preparations and products of each agricultural plant. For example, from the cotton plant, the fibre; the oil, cake, hull-ashes from the seed; fibre prepared from the stalk, and representative cotton manufactures.

23. Rice, wheat, oats, rye, barley, &c., and their mill products. Sugar-cane, sorghum, and their products. Illustrate these mills and factories by models, diagrams, pictures, &c.

24. The cold storage will be used for preserving butter, milk, dairy, and creamery products. The homes, farms, and lives of farmers, should be illustrated by photographs, drawings, &c., of farm buildings, gates, and enclosures, farming operations, and, in fact, everything that can be photographed.

25. The minor industries, like silk culture, bee farming, &c., should be represented by collective exhibits, included n the general state exhibits.

Education.

26. Commissioners and superintendents of education, are recommended to avail themselves of the offer of the United States Commissioner of Education, to supply them with his plan for educational exhibits.

27. Archæological and historical collections and curiosities of all kinds will prove very interesting features of the collective exhibits of the state. Everything illustrating Indian life, colonial life, and the history of people, will be in place. Their books, tools, wearing apparel, furniture, &c., models, views, and diagrams, maps, and charts.

Manufactures.

28. In the manufacturing states the collective state exhibit can be rendered additionally attractive by securing models, diagrams, photographs of interiors and exteriors, with cuts illustrative of the machinery, of the crude material, of the material in process of manufacture, and cuts or views of the products of the machinery.

29. It is also desirable to include charts showing the production and profits of manufactures, the wages of labor, skilled and unskilled; and the complete statistics of this subject properly arranged.

30. Entries for competition cannot be made by persons or firms in a collective state exhibit.

31. State commissioners may, however, receive and display in their collective exhibit a sample of the product of each manufacturing industry in their state, provided the same can be accommodated within the space allotted to the respective states.

32. Commissioners may indicate the names of such contributors by card attached.

33. Commissioners are urgently recommended to adopt a systematic method of collection and numbering, which will embrace the identification of botanical specimens by their leaves, fruit and flowers; the determination of minerals and the analyses, wherever possible, of minerals, ores, mineral waters, soils, and so on. For this purpose it is suggested that the co-operation of the United States and state departments of agriculture and geological surveys and university professors be secured.

34. A careful record of all specimens should be kept by their marks or numbers, and should include the scientific name, common name, locality, owner, operator, or producer, description or analyses, a statement whether the property or article which the specimen represents is for sale or not, and such information as may be interesting. The name should be corrected by the reports of the experts, and all this information should be prepared in such form as will be easily available, and kept for reference at the exhibit.

35. It is recommended that each exhibit adopt a uniform system of labeling within its own collection, as follows:

Name of state ———.
Scientific name ———.
Common name ———.
Owner or contributor ———.
Description and analysis ———.

34. Commissioners should report the progress of their work and all necessary details regarding space and requirements, from time to time to this department.

The Newport News elevator is now in active operation; one of its first jobs was loading the ship Marie Louise, from Cardiff, Wales, with 92,000 bushels of wheat in about 9 hours.

Virginia & Carolina RR.—Good progress is being made in grading this road northward from Roanoke across Mecklenburg county, Va., towards Petersburg.

The Wise county, Va., coal and iron enterprises, we learn from our friend Gen. John D. Imboden, are in a fair way to be energetically developed this coming fall by northern parties of large means that have become interested in them

Prof. John J. Stevenson, of New York University, spent several weeks of July last exploring the Apalachian and Trans-Apalachain regions of S. W. Virginia, in the interests of science alone, the results of which will soon appear in a paper to the American Philosophical Society, of Philadelphia, in continuation of the very valuable paper on the same regions that was republished in *The Virginias* for Feb., 1881, in which he will extend his geological map of Lee, Wise and Scott counties, to embrace Russell, Dickenson, Buchanan and Tazewell counties. We shall look for this paper with great interest as it will give us much new and valuable information concerning a comparatively unknown region rich in mineral resources, and shall publish it in full in *The Virginias*. Virginia owes a debt of gratitude to Dr. Stevenson for his geological work within her borders.

New Va. iron mines.—We learn that Killian, Murray & Anderson have opened two iron ore mines on the land of Isaac Newton and one on that of M. D. Vines near the head of Pine run about one mile from Lofton station of Shenandoah Valley RR., Augusta county, Va. The outcrop of the ore bed opened by these 3 "cuts" or mines runs nearly north and south; the ore is a good limonite and it is reported that the operators are now shiping from Lofton station 2 carloads daily to Crozer furnace at Roanoke, Va. The lessees pay a royalty of 25 cents a ton; they are working from 10 to 20 men at $1 a day wages.

Virginia minerals at New Orleans.—In our last we stated that Prof. Fred. P. Dewey was collecting minerals and metals along the Ches. & Ohio Ry. for the National Museum exhibit at New Orleans. We learn that he was very successful in procuring specimens from our miners and manufacturers and we shall look for a good showing for the Virginias in the National exhibit; especially will the coals of the Great Kanawha basin have justice accorded them, as Prof. D. writes—"I captured the whole coal region and expect to show a ton of specimens from the Kanawha."

Iron Market Report.—Under date of Sept. 22, 1884, E. L. Harper & Co., of Cincinnati, Ohio, send the following official report to *The Virginias:*

There is no special change to note. Stocks are gradually diminishing, and prices are consequently as firm as the unprecedented stagnation will warrant. Sales are reported of several round lots, one of southern iron at a particularly low price, but as no other lots can be had at this price, we conclude our southern friends have braced up.

The following are the prices current at four months:

Foundry.

Virginia strong neutral coke No. 1,	$17.50 to	$18.00
" " " " No. 2,	16.50 to	17.00
Strictly warm blast,	20.25 to	20.75
American Scotch,	17.00 to	17 50
Southern cold-blast,	23.00 to	24.00

Grey Forge.

Virginia neutral coke	15.75 to	16.00
" cold-short	15.00 to	15.50

Pocahontas, Va., coal mine out-put for July and August.—V. Pres. H. Wickham of the S. W. Va. Improvement Co., sends *The Virginias* the following statement of the coal and coke business of his company at Pocahontas, Tazewell county, Va., on Norfolk & Western RR., in July and August, 1884, in 2,000 lbs. tons:

	July.	August.
Coal mined	20,335	14,627
Coal shiped	11,183	8,664
Coal to coke ovens . . .	7,597	6,626
Coal on hand in cars . .	1,555	1,017
Coke shiped	4,413	4,201
Coke on hand, ...	2,225	. . .

Continuing our report from page 116 we have:

Output from Jan. 1 to Sept. 1, 1884:

Coal mined	155,381 tons.
Coal shiped	97,918 tons.
Coal coked	58,881 tons.

The above represents the output of 6 months of mining operations in 1884 and indicates an output of about one-third of a million tons, from one mine, during 1884, of this superior semi-bituminous coal.

A correspondent of the Roanoke, Va., "Leader," states that a run of 1,220 tons of coal, from 610 mine cars, was made through the Pocahontas tipple in 10 hours of one day of the first week in Sept.; and that preparations are in progress to fire the 75 coke ovens that have been idle for some time.

The Great Kanawha Coal-field.—Errata.—Prof. I. C. White of the U. S. Geological Survey, is making good progress in working out a complete section of the coal beds of the Great Kanawha. By the time this reaches our readers he will have finished the 90 odd miles of section from the Ohio at the mouth of the Kanawha up to the Falls and to the junction of the New and Gauley rivers, the so-called head of the Great Kanawha, and have worked out very full sections of Rogers' formations XV, XIV, and XIII, a work which is now rendered possible by the number of openings that have been made along the Kanawha and its tributaries into the coal beds of these formations.

The measurements and observations of Prof. White will change many notions that have long been prevalent in regard to the number and relative place of the Great Kanawha coal beds, as our readers will before long see when Prof. W. communicates to *The Virginias*, as he has permission to do from the Director of the U. S. Geol. Survey, the results of his season's work, thus giving our people advantage of the accurate information he has obtained a long time before it can appear in the regular reports of the survey.

Errata.—A mistake occured in the statement in our July No., page 108, in reference to the thickness of the formations of the Carboniferous along the Gt. Kanawha. That should be corrected, writes Prof. White, so as to make the No. XV rocks 250 ft. thick, and *not* 550 as there stated.—He finds that the Upper coal measures, No. XV, are not as thick by 100 ft. as they are on the Monongahela, adding: Though I doubt not if we could have had the thickness measured before erosion, say at the latitude of Cannelton (on the Gt. Kanawha), XV would have at least 500 feet thick there.

Prof. White is now working out the New River section, mainly that of formation No. XII, and he will probably finish that up to Hinton, so as to have a complete section, entirely across West Virginia's portion of the Great Coal Basin of the Ohio, this season before returning to his chair at West Virginia University.

The Augusta, Va., Stave Mills.—On the first of April, 1883, Mr. W H. Clare purchased, from the Meherrin Lumber Co., a tract of timber land lying in Augusta county, Va., eleven miles west from Buffalo Gap station of the Ches. & Ohio Ry., in the Calf Pasture valley, north of Deerfield. Mr. Clare is a native of Claresville, Amelia county, Va., where he has had 12 years experience in the lumber and saw mill business, and was for 6 years the vice-president and manager of the Meherrin Lumber Co.

This stave factory and saw mill were commenced October 1st, 1883, and put in operation March 1st, 1884, under the name of the Augusta Stave Mills. There is invested there in buildings, machinery, etc., including an iron rail tramway of more than two miles in length, up the mountain, $32,000 Since the 1st of March and up to August 1st, these mills have turned out 1,000,000 staves, and 25,000 sets of heads, besides 225,000 shingles and 100,000 laths. They have also sawed 800,000 feet of white pine and 200,000 feet of white oak. There is a regular force of 75 men employed in the factory and at the saw mill, these are all quartered in comfortable houses belonging to the company and built on each side of the road to the factory. These hands are paid off every evening by tickets which are redeemed at the end of the week. There was no stock on hand the first of August and the factory and saws were working up to their capacity. Mr. Clare has opened a brick-yard on his land and will replace his present dwelling with a brick one this fall or in the early spring.

Lumber in the Virginias.—In the "N. W. Lumberman" of Chicago of Sept. 20, 1884, we find the following:

The stock of hardwood lumber now on hand along the line of the Chesapeake & Ohio Railway, not under contract, is small, as a number of the mills have been cuting under contracts made in the winter and early spring. One mill at Sewell has sold to the Domestic Sewing Machine Company its entire cut of poplar, amounting to about 1,000,000 feet, and another mill at the same place has sold its cut to a shiper to European markets. The latter is mostly four-inch deals, and a very choice lot, at the following prices: 12-inch wide and up, $22, and $17 for Nos. 1 and 2. The sewing machine people pay $19 and $14 for inch lumber, cut from what is left of the log after flitches are cut from it. At this mill 50,000 feet of flitches are cut monthly. The dimensions of the flitches are from 8x14 inches up to 18x36, and they bring green from the saw $18 per thousand, all around. The current prices for poplar are: under one inch, 12 inches wide and over, $14.50 to $18.50 for No 1, and $17 for No. 2.

Ash is in light supply. Good stock from one to two-inch is worth about $20; three and four inch, 12 inches wide and over, $25; good white oak, common sawed $18; white oak car stock for export, 5x12-inch, $19 to $21; quartered oak, clear, six-inch and upwards, $28 to $30. Walnut is worth $60, $40, and $20 for good Nos. 1, 2, and 3. These prices are f. o. b. at any station on the Chesapeake and Ohio Railway west of Hinton. The large mills at St. Albans, Charleston, Hinton, Kanawha Falls, Sewell and Quinnimont are mostly sold ahead.

The stock of dry lumber is small, and the demand, while it has been been light during the summer, has been about equal to the supply. The prospect for fall trade is fair. There are a good many inquiries for future dry lumber to

carry through the winter. There is considerable building going on which will call for the bulk of the lower grades, as most of the buildings going up are of a cheap grade for miners and laborers in our coal mines.

There is a disposition to use band saws in nearly all the new mills, as band sawed lumber brings $3 to $5 per thousand more than circular sawed; and the saving in kerf is a big item.

Crops were good, except corn, which will be light. The great staple in this direction is tobacco, and the farmers this year have the largest and best crop they have had for years, and as it is now being cut and cured, they will be in shape to build a better class of buildings than usual. I hear of a number who expect to build this fall and during the early spring. Judging from all I can see and hear the outlook is fair. There have been no failures in the trade that I know of, and business is in a healthy conditon.

The sash, door and blind business is moderately good. We have no manufacturing of our own. Our market depends on the west entirely. There are no heavy stocks carried by anyone. All our doors, sashes, blinds and the great bulk of our shingles are from either Toledo or Chicago. It has seemed strange to me that no one has started the business of manufacturing these articles at some point in this section; also furniture, as all of our furniture comes from Ohio, and we ship the factories there the lumber of which it is made.

By-products of gas making.—Last year a distinguished chemist startled the gas consumers of London by the announcement that the cost of manufacturing gas was fully defrayed by the sale of the by-products. This statement was so surprising that it was not generally believed. People waited to hear more about it. The chemist who let out this secret from the fullness of his actual knowledge would have furnished more facts to the public had the gas companies challenged his assertion. But they wisely said nothing and there the matter droped. The statement was within the bounds of truth. A few years ago coke was the only valuable by-product of the gas manufacture. There was no concealing its production, and therefore people knew all about it. But science has found a still greater source of revenue in a substance that was formerly thrown away as worthless. This is gas tar, which is produced in large quantity at every gas works. It is transformed into substances of great importance to mankind, but the metamorphosis is conducted so quietly that the public are not aware it. They can see the coke in wagons rumbling by their doors, but the less bulky and far more precious extracts from coal tar are disposed of without their knowledge.

In London, says the New York Journal of Commerce, where gas costs to the consumer about one-third of the ring price in NewYork, there is now less attempt to hide the truth about these by-products. At the opening of the extension works of the South Metropolitan Gas Co. of London last month, the guests were allowed the free run of an immense chemical establishment near by. This was erected for the sole purpose of working up the gas tar produced in the operation of making 20,000,000 cubic feet of gas daily out of 2,000 tons of coal. The gas tar is put into stills holding 8,000 gallons. Heat being applied, naptha first comes on at the low temperature of 100° F. By doubling the heat creosote next is obtained. This is a very important product, used chiefly as the base of carbolic acid. Anthracine then follows upon the application of a still higher heat. When separated from the accompanying oil anthracene appears a solid substance, from which, by chemical treatment, alizar ine is produced. This is an artificial coloring matter containing the essential principle of the madder plant itself.

The discovery is a triumph of modern chemistry not less than the cheap manufacture of the once costly ultramarine (a deep blue pigment originally made by grinding the beautiful *lapsis lazuli*) out of common carbonate of soda. These three are the chief by products of the gas manufacture which will receive the attention of the chemical works supplied with coal tar by the South Metropolitan Gas Co. of London. But there are still other and rarer products which no chemist will throw away, for they are the most valuable of all. We allude to the splendid aniline colors. which are found in this wonderful gas tar. But, notwithstanding such notorious facts, which serve to explain why the gas business is so profitable, the New York companies persist in charging their customers $2.25 per 1,000 cubic feet, or three times the price with which they once paid dividends!—*Norfolk Virginian.*

History and Uses of Limestones and Marbles, by S. M. Burnham, with 48 Chromo-lithographs.—We are indebted to the publishers, Messrs. S. E. Cassino and Company, of Boston, for a copy of the elegant volume, of 392 octavo pages, bearing the above title, one that is printed, illustrated, and bound in the very best style of the arts of the printer, the engraver and the binder as practiced in the artistic city of Boston. Its illustrations are, it is enough to say, faithful reproductions of forty-eight specimens of colored marbles, from all parts of the world, as they appear to the color trained eye when highly polished and ready for use.

This is not a scientific treatise on limestones and mables, but, as the author claims, a work that "presents the facts and speculations of original explorers and writers, so selected and arranged as to illustrate the value of limestones in some departments of geology, but more especially their use in the mechanic and fine arts, and their history in civilization." It is such a work on these subjects as any good common-sense seeker after information concerning limestones and marbles, their origin, history, peculiarities and uses would find it enjoyable and profitable to read and useful to have at hand for reference.

Its twenty-three chapters treat of: Different classes of limestones; Fossils; General divisions of geological time; Limestones of the United States in three groupings, viz.: the Atlantic region, the Mississippi basin, the Rocky Mountains and Pacific coast; Limestones of British America and the West India Islands; Limestones of Mexico and South America; Limestones of France; Limestones of Germany, Belgium and the Netherlands; Limestones of Switzerland and the Alps; Limestones of the Austrian Empire, Denmark, Scandinavia and the Polar regions; Limestones of the Spanish Peninsula and Italy; Limestones of Greece and Greek art; Limestones of the Russian empire and China; Limestones of the Turkish empire; Limestones of Arabia, Persia, Afghanistan, Beloochistan, and India; Limestones of Japan, Australia and Africa; Antique Marbles; Antique alabasters, serpentines, basalts, granites and porphyries; Antique stones and works of art in modern Rome; and of Antique stones used to decorate Roman churches. Its appendix treats of: the Age and locality of the principal limestones: of French marbles; and of Marbles of Great Britain and Ireland, Germany, etc. Of course marbles are included under the headings of limestones, since most of the stones called marbles are in reality but varieties of limestones.

Some extracts from this admirable volume will give a good idea of its style and scope:

Calcareous rocks are of great value in determining the age of strata, on account of the large number and variety of organic remains which they enclose, while they largely contribute to the diversified and picturesque scenery of the globe. Limestones are, in one sense, a link between the mineral and the animal kingdoms, since most of them have an organic origin and possess, on that account, an interest above that of most rocks. The adaptability of marbles to the purposes of art have made them indispensable to man in the higher departments of sculpture and architecture — Preface, p. iii.

A knowledge of the nature and origin of limestones, a rock that contributes so largely to works of art, enhances the pleasure these productions afford and awakens admiration for the wonderful laws of Nature and the methods by which she has brought to perfection the abundant materials of her immense laboratory, and placed them at man's disposal to be applied by his energy and genius to his use and the gratification of his aesthetic tastes.—Introduction, p. v.

(Continued from page 140.)

4. *Granite*, Belgian paving blocks, two varieties, from quarry and works of J.B. Mitchell & Co., at Mitchell station, R. & A. RR., 5 miles above Richmond; J. B. Mitchell & Co., box 264, Richmond. (45).

5. *Granite*, two cubes of building stone, dressed, polished, etc., from J. B. Mitchell & Co., as above. (46).

Nelson.

1. *Manganese*, from Cabell mine, near Warminster station, R. & A. RR. (50).

2. *Limonite*, brown iron ore, from Sleepy Hollow mine, on Dr. J. F. Peters place 2 ms. from Norwood station, R. & A. RR. (51).

3. *Trap-rock*, from dike one mile above Norwood station R. & A. RR. (52).

4. *Mica-schist*, from Combined Locks station, R. & A. RR. (53).

5. *Quartz and Feldspar*, from Combined Locks station, R. & A. RR. (54).

6. *Magnetite*, magnetic and specular iron ore, from mine near Greenway; a steel ore that has been shiped to Pittsburg, Pa. (55).

7. *Tufaceous quartz*, from Greenway, R, & A RR. (56).

8. *Magnetite*, magnetic and specular iron ore, from Dr. J. C, Mundy's mine one mile N. W. from Allen Creek station, R. & A. RR. (57).

9. *Specular* iron ore, from Wheatland mine, No. 11, of Dover Coal Co., near Riverville station, R. & A. RR.—H. G. Wolcott, Boston, vice-president; Echols & Sherwood, Riverville, lessees, who are now shiping 60 tons a day of this ore to Lynchburg furnace. (58).

Powhatan.

Bituminous coal, from Norwood mine of Chesterfield coal basin in Jura-Trias. Mine on S. side of James river; coal dug from bed 8′ to 10′ thich, and barged down James river 3 ms. to Vinita station of R. & A. RR.; 60 tons a week mined now. Charles R. Kennon, Sublett's Tavern, owner. (47).

The Rorer Iron Co., Roanoke, Va., has now 12,000 tons of high grade brown iron ore, limonite, stocked and ready for shipment—when a purchaser at a fair prlce comes along—on its yards alongside the Norfolk & Western and the Shenandoah Valley railways and at its mine at the end of its own railway 6 miles from Roanoke.

Advertising at the New Orleans Exposition.—Reference to our advertising columns will show that a Virginia company has made a contract with the Va. Commissioner to the New Orleans Exposition for the publication of 100,000 copies of a pamphlet, descriptive of Virginia, for free distribution at New Orleans, the Publishing Company having the privilege of using the latter portion of the pamphlet for advertising purposes. We learn that this pamphlet will be in the same form as *The Virginias*, and that it will be illustrated with views of Virginia scenery, etc., and a fine map of the state; this will be one of the very best mediums for advertising that can be imagined.

Railway fares to New Orleans during the World's Cotton Centennial, from all parts of the United States and Canada, have been fixed, by written agreements, at *one cent a mile* each way; for example, the railway distance from Richmond, Va., to New Orleans, La., is 1,045 miles, so the fare from Richmond to New Orleans during the Exposition —Dec. 1, 1884 to June 1, 1885—will be $10.45, or $20.90 for the round trip. This will put it in the power of many of our people to visit this grand school of industry, art and science, since for $50 or $60 one can make the trip and spend a week at New Orleans.—Let every Virginian arrange to go and make it part of the arrangement to at once contribute something to Virginia's collective exhibit.

The Richmond Granite Co. has its quarry and works at Korah station of Richmond & Alleghany RR., Henrico county, Va., 4 miles above Richmond, where Mr. H. F. Smith (address, box 158, Richmond) has charge of operations. The head quarters of this company are at Philadelphia, Pa., where lives its president, J. Binswanger, and its secretary Richard F. Williamson. It began work at this quarry in 1868; it now employs 160 hands, quarrying and shaping Belgian blocks for paving, cuting curbstones, monuments, etc. It has ample machinery for cuting and polishing granite, and does a large business in finishing monuments to design and order. It has supplied large quantities of Belgian blocks to Louisville, Ky., 120 pieces to the ton, and is now sending 400 tons a month, 146 pieces to the ton, to Washington city; from the 1st to the 25th of Sept. over 100 car-loads of products were taken from this quarry by the Richmond & Alleghany RR.—As stated elsewhere this energetic company will make a fine exhibit of Virginia granite, shaped in Belgian blocks, monuments and building blocks, at New Orleans.

Richmond, Va., Granite.—J. B. Mitchell & Co. have a granite quarry and works at Mitchell station, R. & A. RR., 5 miles above Richmond. This company now works 55 hands and ships from 8 to 12 car-loads of Belgian blocks monthly to Louisville, Ky. It has machinery for cuting and polishing granite, and will make an exhibit of Belgian blocks and dressed building granite at New Orleans. Its address is p. o. box 264, Richmond.

The coke-using blast-furnaces of Va. are now in this condition: Gem is in blast with an increased output, so also is Crozer; Low Moor is out of blast for repairs which are being speedily made; Victoria is about ready to go into blast; Longdale is runing its two stacks in its usual steady-going way; Lynchburg is again in blast; Wilton is nearly completed and will be ready to go into blast the last of the year.

St. Albans & Boone Co. RR.—In the "Valley Record," of Madison, Boone county, W. Va., of Sept. 20, we find the following: "The St. Albans and Boone County RR. Co. placed on file last week in the County court clerk's office of this county a complete and accurate map of the line of the road from the point where it enters this county to the place of its exit at Walnut Gap. A profile is also laid down, showing the cuts and fills along the route, all of which will be comparatively light and inexpensive to make. Maps of those portions passing through Kanawha, Lincoln and Wyoming counties have already been filed in those counties. The one on file here is the work of Chief Engineer Wm. C. Reynolds and Maj. J. S. Cunningham of St. Albans; it is, without question, one of the neatest and finest maps we have ever seen.

There was a short session of the County court Monday. The only matter of importance before the court was that of a submission to the voters of the county of the question of a subscription of $32,000 to the St. Albans and Boone Co. RR., the county to receive an equivalent amount of the company's stock upon the delivery of the bonds. The court sat down hard upon the proposition, refusing to submit it to a vote of the people."

C. & O. Ry.,—information wanted.—A correspondent asks for the following information for an English correspondent. If anyone reading this has time to furnish this large quantity of valuable information we will not only forward it, but will publish it for the general good:

1. Name and address of the manager of the pool or syndicate of the various coal mines along the line of the Chesapeake & Ohio Ry.

2. How many collieries there may be in competition for the supply of the towns along the line.

3. The output of coals from each.

4. The quality and selling price.

8. The price of labor.

Mine Inspector O. A. Veazey, of Dego., W. Va., can answer these questions officially, we presume. We wish he would.

Ginseng.—The war in China finds an echo in the wilds of West Virginia; a correspondent writes: What do you suppose I have to do with the war in China. Well, here in Boone county, West Virginia, just on the opposite side of world, it has knocked down the price of ginseng from $2 to $1 a pound, and affects all the trade in the county. You may think ginseng a small matter, but there has been shiped from this county alone, in one year, as much as $35,000 worth.

The actual cost of mining iron ore at three of the leading Virginia mines now in operation, where the ore is found in exceedingly favorable conditions for cheap mining, is 55 cts., 75 cts., and 100 cts., per ton of ore, exclusive of royalties. This cost is, of course, all labor except the small items of the wear of tools and the cost of powder to each ton of ore.

The Va. Tin Mining & Mfg. Co. has been chartered by Judge McLaughlin of the Circuit court of Rockbridge county, Va, with a capital stock of $600,000. Edgar Whitehead of Amherst C. H., is its president and R. M. Cox its secretary. This company proposes to work the tin deposits that have been developed in the Blue Ridge in Rockbridge and Nelson counties, Va.

Virginia at the New Orleans Exposition will probably have her mineral wealth fairly well represented; railways and individuals are taking an interest in collecting specimens of her ores, etc., the Smithsonian Institution has had an active agent in the state in Mr. Jas. Temple Brown, who is completing the collection begun by Prof. Dewey, which we have before refered to, but more particularly that of coals,—he recently obtained samples of coals and carbonite from the mines of the Richmond, Va., basin. The U. S. Land office is also making a collection of economic minerals from this state for its exhibit.

All these collections will be advantageous to Virginia, but they only render it the more important to have her collective exhibit, one that will be geographically arranged by counties, made more complete, that visitors to this great World's Exposition may compehend *the extent* as well as character of our mineral resources.

The Staunton Male Academy, Wm. H. Kable, A. M., principal, has commenced its first session most prosperously; we learn that it now has seventy pupils in attendance aud more are seeking entrance, so it will have fully as many in attendance as its accomplished principal desires for a first session in a new place.

We are especially gratified at the success of this new school, in this already noted educational centre, since Capt. Kable, while no whit behind the "old schools" in his disciplinary and scholastic repuirements, is full of the spirit and demands of this age of material and scientific development, as evidenced by the ample provision he has made, in teachers and appliances, for the thorough teaching of the natural sciences, in the comprehensive sense of that term, and of civil engineering. To all the grand features of our other excellent Virginia preparatory schools we think he has added the one thing needful that they have either neglected or so taught as to confer little or no benefit upon the pupils.

The Virginia China Clay & Fire Brick Co., whose works are at Lipscomb, Augusta county, Va., on line of the Shenandoah Valley RR., will make a full exhibit, in the Virginia section of the New Orleans World's fair, of its raw materials and products. Its works are now in full operation, making full time, and making in the brick department 5,000 stamped fire brick a day.—These bricks have been fully tested and found equal to any made in the country; they are being sold to Richmond, Roanoke, and other places. The clay department is also runing full time, washing and pressing 10 tons daily; the demand for this clay, at the potteries of Trenton, N. J., and East Liverpool, Ohio, is such it has been found necessary to triple the output, so new machinery has been purchased and arrangements are being made to supply this increasing demand. Mr. J. S. Lipscomb, Lipscomb, Va., is superintendent of the operations of this company.

Virginia Minerals at New Orleans.—We learn that the Shenandoah Valley and the Norfolk & Western railways are now geting up a collection of minerals from along their lines and the country tributary to them for the New Orleans exhibition. This is the right thing to do. If all our railways will do the same thing, adding timber exhibits, the Virginias will be fully represented; in no other way that we know of can it be as well done. It is probable that this collection will be turned over to Dept. IV of Virginia's collective exhibit, and so form part of the large collection now being made to illustrate at New Orleans the mineral resources of this state and their distribution.

The Virginias.

Serial No. 58. Vol. V.—No. 10.

Staunton, Va., October, 1884.

Jed. Hotchkiss, Editor.

Errata.—On page 166, second column; for "pure" in 6th line read "free."—In next to last line of Goochland article for "175" put "75."

Coal and Coke Traffic of Ches. & Ohio Ry. Sept, 1884.

General Manager C. W. Smith sends *The Virginias* the data for the following statement of the total output and distribution of coal and coke received from mines on line of C. & O. Ry., (imcluding fuel on Lexington division) during September, 1884, and Sept., 1883, in tons of 2,000 lbs., compiled by fuel agent, J. W. Hopkins :

Kind.	1884.	1883.	Increase.	Decrease.
Cannel	8,014	810	2,204	.....
Gas	26,085	23,606	2,479	.....
Splint and block	19,634	8,103	11,581	.....
New River, &c	22,046	30,769	....	8,723
Coke	9,175	6,873	2,302	.....
Totals	80,004	70,161	18,566	8,723

The distribution of the above was as follows :

	1884.	1883.
1. To Ches. & Ohio Co. for its own use	18,603	19,090
2. To Huntington, for West via. Ohio river	1,111	.....
3. On Elizabethtown, L. & B. S. and K.C.RRs	10,700	3,997
4. On Ches. & Ohio RR., excepting Richmond	8,403	15,657
5. To Rich. & Alleghany RR. at Clifton Forge	181	2,176
6. To Valley RR. of Baltimore & Ohio at Staunton,	....	.....
7. To Shenandoah Valley RR. at Waynesboro	....	40
8. To Va. Midland at Charlottesville	3,566	4,677
9. To Rich. Fred. & Potomac RR., at Junction	893	466
10. To Richm'd for consumption, includ'g tugs, &c,	9,906	7,159
11. To James River wharves for shipment	4,664	8,313
12. To Newport News, For consumption, &c	383	1,456
12. To Newport News, For shipment	21,594	7,180
Totals	80,004	70,161

The movement from January 1st, 1884, to Sept., 30th, 1884 inclusive, and for same time in 1883, was as follows :

	1884.	1883.	Increase.	Decrease.
Cannel	16,478	20,514	.....	4,036
Gas	232,568	273,160	.....	40,592
Splint and Block	78,121	75,671	2,450	.....
New River, &c	304,189	301,004	3,185	.....
Coke	51,802	77,834	.....	26,032
Total	683,158	748,183	5,635	70,660

We are pleased to note the resumption of "increases" in this report. Now that Low Moor furnace is again in blast New River coal will again come into the "increase" column.

Iron-market report.—E. L. Harper & Co., of Cincinnati, under date of October 20, 1884, make the following special report to *The Virginias :*

Business is fairly active, and though prices remain unchanged, a better tone and stronger feeling prevails in the market. There is a likelihood that the bottom in prices has been reached. The stocks of good foundry grades have been so reduced that consumers are begining to realize that an immediate supply for their wants cannot be commanded with entire security.

An analysis of the vote of Ohio on the 14th inst. reveals the fact that the large and important manufacturing cities gave unmistakeable support to the protective tariff congressional candidates.

We quote as follows, at 4 months :

Foundry.

Virginia strong neutral coke No. 1, at	$17.00 to $18.00.
" " " " No. 2, at	16 00 " 17.00.
Southern cold blast	21.25 " 21.75.
American Scotch	17.00 " 18.00.

Grey Forge.

Virginia neutral coke at	$15.50 to $16.00.
" cold-short at	15.00 " 15 50.

The Pocahontas Mine Explosion.

Among the advanced pages of the proceedings of the American Institute of Mining Engineers that have recently come to hand is the report of J. H. Bramwell, of Roanoke, Va.; Stuart M. Buck, of Coalburg, W. Va.; and Edward H. Williams, Jr , of Bethlehem, Pa., on the memorable Pocahontas mine explosion, read at the Chicago meeting, May, 1884, of the Institute. We devoted much space to accounts of this lamentable accident at the time of its occurence, but consider this report of such value that we reproduce the most of it, as follows :

"The Southwest Virginia Improvement Company began operations in the Bluestone-Flat-top coal-field, situated in Tazewell county, Virginia, in the fall of 1881. In May, 1883, the company had built 200 coke-ovens, and by March, 1884, had 9000 feet of entries, exclusive of air-ways, in the Nelson or Big coal-bed of this district (which here averages 11 feet in thickness), and had extracted 200,000 tons of coal, representing an area of about 20 acres. About this opening has grown the recently incorporated city of Pocahontas, and the completion of the New River Branch of the Norfolk and Western Railroad to this point enabled the company to make large contracts for supplying coal and coke, so that it was deemed necessary, on account of the limited area developed, to work the mine day and night to fill orders.

"At 1.30 Thursday morning, March 13th, the inhabitants of Pocahontas were awakened by a violent shock, and within a few minutes all knew that the East mine had been the scene of an explosion of so general a nature that, of the 114 men at work there, not one had escaped. The daily papers gave more or less distorted accounts of the number of victims, the scenes in and about the mine, and the probable cause of the disaster.

"At the request of the company, the president of the American Institute of Mining Engineers appointed the undersigned a committee of three to investigate the matter, and the committee thus constituted presents the following report, accompanied by a copy of the testimony taken during the investigation, for preservation in the archives of the Institute.

"Pocahontas was reached on Thursday, April 24th, and left on Friday, May 2d. During this interval the committee made repeated visits to the mine, especially to the points of most importance, examining it carefully in every part, and summoned a number of witnesses, twenty-six of whom appeared and testified.

"The mine had been left in the same state as when the bodies were removed, in order that tests for gas might be made as well as that the traces of the explosion might not be destroyed.

"On the part of the miners, and especially of the mine-boss, lately discharged, there was a determination to withhold all information, as they thought the investigation to be a company affair, and did not wish to neutralize whatever effect their testimony might have, should legal proceedings be be-

gun by the relatives of those lost in the explosion. Much valuable time was consumed in removing this impression. In addition to this, a great number of the men who worked in the East mine on the day-shift had gone to other districts, and much valuable testimony was lost. In fine, had a thorough investigation been undertaken at once, when all interested were on the spot, and before there could have been any collusion on the part of those interested in withholding and distorting the facts of the case, a much greater value would attach to the direct testimony in regard to points now at issue. The best method now remaining, of solving the questions involved, will be tests made at the mines for the presence of gas after the mine is again in full operation.

"After viewing the effects of the explosion as exhibited at the entrance of the mine, it is almost incredible that so little damage had been done to the mine itself. In undertaking this investigation the committee had regarded themselves in the light of possible martyrs to science, and take pleasure in reporting that, while in some places the timbers are racked out and the wooden track torn up, with here and there a local resultant fall of fire-clay, on the whole the mine is little the worse for the explosion, and two or three weeks' work will remove all traces."

Then follows an explanation of the accompanying map, which is the same published in the March No. of *The Virginias*, page 47, which the reader can refer to, with the addition of arrows showing the course of the explosion currents and of letters showing the places where bodies, etc., were found. The origin and cause of the explosion are thus stated:

"The explosion probably originated in the north branch of the third east entry and spread in all directions. One portion of the current went westward and northward to the headings of Nos. 1 and 2 north off No. 3 east, to those of the main entry and air-way, and of 4 and No. 5 west; another part went south, where the dust was deep and dry, and here its power was increased by this agent, while throughout this area its greatest effect is exhibited. At the second east entry, part went west to the main entry, turned northward to the third west and went along this, while the remainder continued south and received further increase of force. On reaching No. 1 east, a part turned eastward, extending to the headings of this entry and its air-way, while the rest turned west, tearing up the track, raking out the props, and blowing track, props and cars out of the main and intake openings.

"The rebound from the area of the second north crossed the third west in part and traversed the area of the second west, while the remainder went west and out of the fan-opening, wrecking the fan. Part of the westward current along No. 1 east was deflected northward in the main entry, and went partly through No. 1 west and the area of the first, while the rest went out No. 2 west with the part that came south from No. 2 north.

"The current carried a burning body of gas and dust, the latter in all states of coking; and all the bodies, with a few exceptions, were found badly burned. Owing to the length of time between the death of the men and the removal of their bodies, the latter were in such a state as to make an examination as to the amount of asphyxiation an unpleasant if not absolutely impossible task. In some cases the evidences of burning had been destroyed by the submergence of the bodies in water. The evidences, therefore, of the relative amounts of fire in the areas mentioned have been gathered from the mine itself; but it may be well to state that conclusive evidence has been adduced that within five minutes after the first explosion there was not a man alive of those in the mine; so sudden and so general had been the catastrophe."

Mention is then made of the fruitless efforts to enter the mine and of the decision that was reached to seal it and smother the fire: of this the report says:

"Under the circumstances perhaps this course was wise, as, had the ventilation been restored while any of the coal-dust was still glowing and fire lingering among fragments of smoldering timber, a serious conflagration might have been started and the mine ruined. The mine was closed by building double dams with clay stopings, and an attempt was made to flood the workings. As they were toward the rise, this was impossible from the compression of the air in the upper workings, which brought such a pressure upon the dams as to cause large crevices and a corresponding leakage. To remove the air and relieve the pressure, a bore-hole was sunk to strike the extremity of No. 3 north off No. 1 east, and so accurately had the mine-surveys been kept up that the entry-center was struck within a few inches. This allowed the water to flood about one-eighth of the mine, while the air, as it escaped through the hole, showed that the fire was extinct."

The system of ventilation used in the mine is then described, essentially as we gave it last March; it is criticised by the statement that "All the impurities of the mine were thus led around the workings and concentrated in their course, while, to increase the difficulty, the work was pushed day and night with a force of inexperienced men, using at least twice the powder properly required. The door-service on the night-shift was imperfectly performed; and the committee has been able to show, by concurent testimony, not only that doors were frequently left open, but that on the night of the explosion and for a part of the time during the fortnight previous, the two most important doors—at the junction of the main entry and No. 1 east—were left open, untended and hooked back."

Of the system of mining in use at Pocahontas, the report says: "This is clearly shown on the accompanying map, and may be described as pillar-and-stall worked out in panels or blocks.

"The mine has been opened by a main-level gangway with parallel air-way along the strike of the seam, off of which a system of double cross-headings are driven at right angles up the 'rise,' intersected at intervals by double cross-entries parallel to the main level gangway, thus dividing the coal into blocks or panels of 500 feet by 1500 feet (bisected in length by extra cross-heading, *e. g.*, No 2 E.), with rooms turned off to the right and left of the double cross-entries.

"The main gangway and cross-headings are driven 10 feet wide and 8 feet high; pillars are left standing, 100 feet in thickness, on either side of the main gangway; and pillars of 30 feet are left between entries and air-courses. These pillars are broken through every 100 feet for ventilation.

"The rooms are started 9 feet wide, and at about 7 yards are widened out to 18 feet. Pillars between rooms are 15 feet thick; from 2 to 3 feet of coal is left in the top to keep up the friable shale overlying the coal; two parallel rows of single props are set in the rooms, the lines of the rows being 6 feet apart, and the props in the rows stand 10 feet center to center; wooden tracks are used in the rooms, and laid next to the upper pillar, and ballasted with coal-slack. The top coal is drawn when the pillars are robed. This takes place in each panel or block as soon as the rooms are worked out to their boundary and simultaneously with the general advance work in the mine. By this system the extent of workings to be kept up is greatly reduced and concentrated and the coal won from the pillars still firm and in good condition. The coal won in the advance, exclusive of robing pillars, is estimated to be 30 per cent of the entire bed. The final work will leave 20 per cent in the mine.

"The coal is collected in cars of two tons capacity and brought by mules to sidings on the east and west headings, near their junction with the main gangway. From these sidings the coal is taken by a mine-locomotive to the tipple, and the empties are returned."

Of the general condition of the mine when first opened and when examined by the committee, the report says: "On the 9th of April, nearly one month after the explosion, the mine was relieved of the water-dams, and on that day it was entered by Mr. William Moody, the mine-superintendent now in eharge, with a party of experienced miners from the Wilkesbarre district of Pennsylvania, to recover the bodies of the dead miners. His narrative of exploration and recovery in the accompanying testimony is a clear and graphic recital of the appearance, condition and attitude in which all the bodies recovered were found. His opinion as to the probable position and action of the miners in the different sections of the mine at the moment of the explosion is well drawn, and has been valuable in assisting to form some conclusions relating to the possible condition of the mine and miners at the moment of the explosion. On the afternoon of the 24th of April the committee, accompanied by Mr. Moody, made their first entrance into the mine.

"The first general impression, on passing through, was caused by the apparently small amount of serious damage done to the workings. Notwithstanding extensive areas had been completely swept of their timbers and props, very few falls were encountered. Strikingly noticeable, in the second place, was the large accumulation of coal-dust and soot, similar in appearance to lamp-black, distributed throughout the different sections of the mine. The bodies had already been removed, but otherwise the mine was apparently in the same condition as it had been left immediately after the explosion, except in the small flooded area.

"The superintendent had given instructions that nothing should be disturbed, except where it was necessary to remove obstructions in the gangways in order to carry out the bodies. This greatly facilitated the work of the committee, and its correctness in minor details, relating to the spread and direction of currents, intensity and direction of the explosive force, and the possibility of determining the locality of the origin of the explosion. At the north and south branches of No. 3 east, (near the word Door on the *Virginias'* map) the committee found the most destructive and violent action in the whole mine unmistakably to have taken place. Here the explosion originated, and extended southward and westward through all sections of the mine. The complete destruction of the mine-cars and the badly burned and mutilated condition of the men's bodies found in the headings of the north and south branches of No. 3 east present conclusive evidence of the tremendous force which had its origin at this point.

"Only small pieces of the miners' boxes and powder-kegs were to be found. Fragments of flesh were seen adhering to the breast of the headings. The appearance of the wrecked cars and position of the bodies would indicate a force tending towards the face of the headings, but by far the greater and more violent action was in a westward direction until it reached the main entry of No. 2 north; here the current split, one part being deflected southwards through the district C, (that east of the Main entry between Nos. 2 and 3 east), sweeping with an irresistible force through the face of the rooms, destroying everything in its course.

"In all of the seven or eight rooms in the northeast corner of the district marked C the powder kept in the miners' boxes seems to have exploded; but, excepting here and in a number of the rooms north of the fan-entry, no powder was exploded, although the cartridge-paper at the side of the powder-kegs was in many instances chared, and in Nos. 3 and 4 north off No. 1 east, the kegs themselves were chared. That no warning was given is evident from the position of the bodies, as all were found lying close to their work, mangled and badly burned. Timbers and track were swept out of place, and cars wrecked.

"The evidences of an intensely-heated flame, in strong incrustations of coke in the roof and ribs of the room, were uniformly observed throughout the northeast area of C. The general appearance of the other portions of this district is hardly less marked. On the left side of C the men appear to have had some slight warning, as a few were found in their rooms, stricken down while runing to the entry. The mangled body of the night-foreman, Hampton, was found dismembered in the gangway in the lower part of No. 1 north, a short distance off No. 2 east; the fragments of another body were found in close proximity to that of Hampton. These had evidently been struck by the cars, which were blown with great force down No. 1 north, as we found the cars jamed and wrecked in No. 2 east, and upon the axle of the first, on the under part of the frame, were pieces of clothing, as if the cars had passed over the bodies.

"The main body of the explosion undoubtedly had its center of action in the lower half of the district B, (the one east of the Main entry between Nos. 1 and 2 east), throughout which large accumulations of coal-dust and soot were everywhere visible.

"In B, east of No. 2 north, portions of track are swept out from the face of the rooms toward the entry, whilst in B, west of 2 north, this action appears to have confined itself more within the line of the second 'break through,' back from the face of the rooms. From B the explosive force tends southward towards No. 1 east, and thence up 3 and 4 north. This section of the mine, Nos. 3 and 4 north, had the purest air, and the action of a strongly-heated current of gas surcharged with the finest particles of coal-dust, coming with great velocity into an atmosphere of fresher air, naturally created intense combustion and generated the highest temperature in the mine. Chared timbers and a strong coating of coked dust adhering to the face, side, and roof of almost every room and through the entry, with occasional sections of coal coked on the solid pillar, furnish conclusive evidence to substantiate this, apart from the fact that the bodies found here were more badly burned than in any other portion of the mine, and in almost every instance had their hands held before their faces as if to shield them from a flame which they must have seen coming towards them. Throughout this area the men in all of the rooms which were being worked had some warning, the bodies being found on their faces with their arms extended and hands opened, as if they had fallen whilst runing; none, however, had run more than fifty feet. In the upper rooms of A the men were caught in the working faces; some had been siting down talking, and had only time to jump up when killed. Others had seen the flame coming, and, puting up their hands to shield their faces, had fallen in this position and were found on their faces. The man found at the face of No. 4 north heading had probably been siting on a pile of coal smoking, and, seeing the flame coming up the entry, had jumped down, and was found lying at the foot of the pile, on his back, with his arms above his head, with clenched fists. Of those instantly killed without warning, some were at work, making their under-cuts, and were found, pick in hand, in the act of striking. One, siting on the floor with his dinner-can between his legs, was evidently killed while eating. All the bodies in there were badly burned and chared. The action of any violent explosion in this district was not noticed, as all the timbers were standing, and the tracks in the rooms were intact, and none of the bodies were mangled.

" When the current from the explosion in the lower half of B (between Nos. 1 and 2 north, east of Main entry) entered the entry No. 1 east, it broke through the stoping of the air-way immediately opposite, and divided, the greater portion going westward to daylight, and the remaining portion turning east. A part of this easterly current passed up into Nos. 3 and 4 north, but the strongest force was directed towards the face of the air-courses and the headings of No. 1 east.

"The man found in the air-course had been decapitated and his body cut in two parts, possibly by flying timbers. The man found in No. 1 east heading had been thrown violently against the face, where small portions of the flesh and clothing were still adhering to the coal.

"Returning westward on No 1 east towards the main entry and passing the district B, we encountered evidences of a great force in wrecked cars and the dislodgement of heavy sets of timber, caused in part by the cars being thrown against them. The air-course parallel to No. 1 east, which was the main intake, was swept clear and scored with deep furrows by the cross-ties and timbers which were hurled out to daylight. Returning to No. 3 east at the spot D, (at the word "door" between the entrances to 3 and 4 north on map in *The Virginias*), we noticed in the close headings of Nos. 1 and 2 north, the loaded cars forced off the track towards the face. The bodies of the men at work had been thrown forward and badly burned and lacerated.

"The main currents, rushing from the face of the north and south branch headings of No. 3 east, met at the air-way and the main gangway, part going north and part going south. The four men at work in the main headings showed only slight signs of being burned, but were badly contused from the severity of the concussion. The same fact was noticeable on the bodies of the men at work in the close headings of Nos. 4 and 5 west; the cars were also wrecked by the direct action of the current. The reaction forced some loaded cars down the main entry, and these, jumping the track, knocked out a few props, occasioning a small fall of roof. Proceeding southwards, down the main entry and air-way, the currents were not very strong, as they were neutralized by the opposing currents from No. 2 east, as shown by the fact that the trip of loaded cars standing in this part of the main entry had been stoped by the front car leaving the track; the others, ten or twelve in number, were wholly uninjured, not even the coal on the surface being disturbed. Taking up now the course of the current issuing west out of No. 2 east, we find that it divided, a part going north as described, and the stronger and greater force rushing through the main entry into No. 3 west, projecting the empty cars standing on the track at that point to the junction of the same with No. 1 west, piling them up in an inextricable mass and sweeping out timbers the entire length of No. 3 west entry, allowing the roof to fall for a distance of about 200 feet. This, as far as we could judge, was the greatest material damage done to the mine proper.

"In G, (the region of Nos. 1 and 2 west), where the current was next deflected, about thirty colored hands were working. These men had congregated in an entry, talking and playing whilst waiting for cars, as was testified by one of their number who had come out of the mine, not feeling well, about half an hour previous to the explosion. At such a distance from the origin of the explosion it is quite natural to presume that they must have had some little warning, and this was evident from the manner in which their bodies were distributed along the entry. They must have made a rush to escape, but none had proceeded more than 50 feet before being struck down by the force of the explosion and killed. There are evidences of a quick, intense flame sweeping through this area, from the charing on the timber and finely-coked dust covering the sides and roof of the rooms, in some instances extending close up to the face. The bodies were all more or less burned and almost striped of their clothing. An explosion must have occured in the lower half of G, as we found props down and track twisted out of place in some of the rooms. All the powder kept in the rooms was uninjured with the exception of two or three kegs in the lower half of G, where evidences of explosion were strongest. Passing southward into F (west of main entry between 2 and 3 west), a body of gas coming from G entered the better-ventilated portion of F and exploded. The force shows itself again in a southeasterly direction, coating roof and sides, and filling it with coked dust and wrecking a few cars in entry No. 2 west. There were only a few men engaged at work in F, and some of these met an instantaneous death in the heavy slate-fall, which crushed them while in the act of robing, this being the only portion of the mine where pillars were being drawn."

The conclusions of the committee are stated as follows:

"The conditions leading to the explosion were the following:

1. The unusual dryness of the mine.

2. The very large quantity of dust in an extremely fine state of division.

3. The constant working of the mine day and night, allowing no time for clearing the air.

4. The use of excessive quantities of powder, largely increasing the amount of dust.

5. The probable existence of small quantities of fire-damp slowly given off from the coal.

6. The employment of incompetent and inexperienced men.

7. The almost complete stagnation of the air on the east side of the main entry, owing to the fact that the main doors were untended and fastened open, allowing the air to pass up the main entry direct to the fan.

8. The failure to recognize and appreciate the previous warnings of danger given by occasional flashings of unusual extent when shots were fired, indicating the need of special precautions.

"The existence of fire-damp in the Pocahontas mine is the disputed point. This committee is not satisfied on the subject, and meanwhile submits the following evidences bearing on the case:

The superintendent and the mine-boss unite in declaring that they had seen no evidence of gas, and that no complaint of gas had been made to them previous to the explosion. The same is true of the timber-man and of the man employed to keep the rooms on their true course. In this connection may be stated the explanation given by the superintendent regarding the mention of gas and blowers in the mine-regulations. The rules were copied from a set used in eastern Pennsylvania, and the intention was to omit all references to gas, but one paragraph was inadvertently retained.

On opening the mine after the explosion and flooding, no trace of fire-damp was found.

On visiting and thoroughly inspecting the mine, the committee found no traces of fire-damp, though ventilation had been only partially restored, especially in the workings to the rise.

On the other hand, there is testimony, although from men generally inexperienced with gas, leading to the belief that when the mine was strongly worked there was a slight but general escape of fire-damp, too slight to admit of detection except in rare cases, and probably in all cases too slight to occasion danger if unmixed with coal-dust and if diluted by proper ventilation."

We would mention:

1st. The burning of the Ray brothers by a powder-explosion, their powder-keg being fired, as was supposed, by a blown-out shot from a distance of 120 feet, and not in direct line, being at the time protected by the angle of a break-through.

2d. The burning of George Britten, described by himself as having been done by a flash following a shot fired in the face of his room, he being about 35 feet distant and protected by an angle of the coal.

3d. One instance related of a flickering blue flame seen in the undercut near a miner's lamp, and attributed by him to fire-damp issuing from the shaly slate left in the floor and overlying the lower bench of coal remaining unworked.

4th. The general practice of flashing the powder smoke after a standing shot by holding the lamp at the face of the coal in the hot smoke, and occasional instances when a similar effect has been produced by the shot itself.

The flashing of the smoke seems to have been almost wholly unknown to the management, and, while not unusual in other mines, the practice seems to have been so general here and the flame so persistent as to lead to the supposition that the products of imperfect combustion of the powder may have been reinforced and quickened by a small amount of fire-damp.

5th. Two instances in which a body of flame has been described as flashing back 60 to 100 feet from the head of an entry, following the firing of a shot, without injury to the men.

In conclusion: We believe that the explosion was due mainly to dust, and that it originated either in the east headings at D, or very possibly in one of the rooms south of D, the evidence of a short northward current being obliterated in the latter case by the stronger reaction from the close headings. We cannot determine the initial cause, whether a blast or the accidental ignition of a small accumulation of fire-damp, but we have obtained no direct proof of any past occurence of fire-damp sufficient of itself to account for even a slight explosion, and are forced to believe that the explosion was due either to dust alone or to dust quickened by an admixture of fire-damp too slight for detection by ordinary means.

At the time of our examination the mine was in no condition for determining these points and we were not prepared to conduct such experiments, but as soon as the mine is again in full working-order a course of experiments should be undertaken, both in the interest of science and for the better preservation of life and property. Repeated tests should be made on the spot, of air from differents parts of the mine, and trials made with suitable apparatus to explode the dust alone, especially where the finely-divided mineral charcoal or mother-coal abounds.

This postscript is added: The necessity for free tests and systematic experiments, as above mentioned, is emphasized by the occurence of a slight and harmless explosion which has taken place since the resumption of work, notwithstanding the employment of experienced men, the cleaning and wetting down of the mine and the improved condition of ventilation.

Virginia mining notes.—R. G. Kirkpatrick has leased the "Dill" ore beds, near Bell Valley station, Ches. & Ohio Ry., having obtained a contract from Victoria furnace for the "red-shale" and "fossil" ore he will dig from that mine.

Harman Lerner, of Mason City, W. Va., has leased from E. A. Packer, of New York city, 100 acres of his Guy Run iron lands near Goshen, Rockbridge county, Va. It is reported that Mr. Lerner has opened a promising manganese mine on this property.

Lynchburg and its Enterprises.—Many years ago, when Virginia determined to commence a system of internal improvements by the construction of leading lines of railway, the then town of Lynchburg assumed a position in relation to the great forward movement, which placed her of first importance in the deliberations which decided the direction the highways should take in penetrating the interior and passing through the territory of the state. From Hampton Roads to New Orleans all leading minds discerned a great route upon which Virginia should steadfastly fix a purpose in accomplishment. But little discussion ensued in placing Lynchburg a point on it as the eye passed over the long extended field, from which great resources and immense inland commerce were to find an outlet to the markets of the world.

Before Norfolk or Richmond or the states of the Mississippi Valley had taken action, the enterprising town of Lynchburg with less than eight thousand inhabitants steped boldly forward and perfected the plans which insured the construction of the work from that place to the Tennessee line

Thus the middle link through the enterprise of Lynchburg was constructed before the eastern or seashore division or the extension to the farther south-west were fully provided for. The Virginia and Tennessee Railroad, now a division of the Norfolk and Western line, is an enduring monument of the boldest effort of the days which started Virginia on her destiny of development and commercial progress.

Through the intervening years and becoming a city of near twenty-five thousand people, bristling with enterprise and success, she has continued other leading lines of railway and stands out finely a living and thrifty centre of industry and commerce.

In that wide tract of country embracing south Bedford, Franklin, Floyd, Carroll and Grayson in Virginia, and the great watershed of North Carolina bordering on Virginia, is a country her own by primitive modes of transportation, and she has determined it shall continue to be hers by right of enterprise, the investment of her capital and the dash of her business men.

No sooner had the Legislature passed the bill for the construction of the Lynchburg and Southwestern railroad, than the work is taken up by her. The *Virginian* in a series of numbers entitled "Look to the Interior," described, minutely, the whole country, its records and giving as far as general observation enabled it to do so, a satisfactory basis upon which the movement for construction of the work could be commenced. The investigation has gone on under the charge of well informed men who have made reports of the most encouraging character. The country abounds in varied and rich resources. It shows marvelous increase in development in the last thirty years and in all that combines to render rural districts, abounding in the elements of wealth and in mixed productions it is almost equal to the favored locations of the Southwest of our state.

As in the commencement of her progressive era, Lynchburg again comes to the front and says this new work must be accomplished, and to that end has set the machinery in motion for it.

The improvement we presume will be emphatically for for Lynchburg, the country it develops and the associated interests of both. It will doubtless have a large share in opening out the city and enlarging its fair proportions on the beautiful plateau which spreads along a wide area on its western borders. With her large advantages and the new improvement finished our most important railroad city will assume rapidly greater distinctions and be known in later years as she was in the first of the progressive era—large in resources, liberal in effort and successful in enterprise.

Bramwell is the name of a new mining village that has recently been laid out on the west bank of Bluestone river, Mercer county, W. Va., on the new westward extension of the New River branch of the Norfolk & Western RR. 5 miles below Pocahontas. This village is deservedly named in honor of Mr. J. Herbert Bramwell, the distinguished mining engineer now in charge of the mining operations of the Flat-top coal companies. This village will be a station on the railway, which will be completed to it about the end of the year; it is now connected with Abbs-Valley station by a good wagon road. The Flat-top coal company will have its local headquarters at Bramwell, which oocupies a handsome piece of bottom land in a large bend of Bluestone river.

A Universal Day—a whole day, not one halved into 12-hour parts, but a mean solar day, to begin, for all the world, at the moment of mean midnight of the prime-meridian, that of Greenwich, coinciding with the civil day and date begining at that meridian, and to be counted from zero up to 24 hours—was recommended to the nations for adoption by the late International prime-meridian conference that met in Washington.—This is another movement in the right direction, one that *The Virginias* practically advocates, esssentially, by publishing its railway time tables in 24-hours time.

Greenwich the Prime-meridian.—The conference of the nations that recently assembled at Washington. D. C., to discuss the question of adopting a common prime-meridian for all nations, closed its labors by adopting a resolution making the meridian of Greenwich observatory, England, that prime-meridian from which longitude shall be computed 180° plus, as East longitude, and 180° mrinus, as West longitude. This very important conclusion was almost unanimously concured in, so we may now look for accord in the meridians of most maps that will hereafter be published.

South Branch RR., a branch af the Baltimore & Ohio from Green Spring Run station of its main line, up Green Spring run and then across and up the South Branch Potomac river to Romney, the county-town of Hampshire county, W. Va., was opened for business the 18th of last month.

The Wheatland mine iron ores, No. 11 vein, as analyzed by J. B. Britton of Philadelphia, is composed of the following ingredients:

Metalic iron, pure	62.51	Alumina	0.69
Oxygen with the iron	24.43	Lime	0.06
Silicious matter, insoluble	10.81	Magnesia	0.03
Water	0.73	Manganese oxide	trace
Sulphur	none	Undetermined and loss	0.422
Phosphorus	0.069		
			100.000

These mines, near Riverville station of Richmond and Alleghany RR., Amherst county, Va., are now worked by Echols, Sherwood & Co., who are furnishing the Lynchburg furnace about 60 tons daily of this high-grade specular ore.

W. Va. Coals near the Ohio.—In a late issue of the Huntington, W. Va., Advertiser we find the following: Coal prospectors are meeting success in the hills two to three miles back of town. Several finds are reported this week which show that the coal field is quite extensive. It will not be long until we have a large mining village in our suburbs. There are two veins developed, one probably six feet and the other about three and a half.

Pocahontas, Va., Coal mine output for September, 1884.—V. Pres. H. Wickham of S. W. Va. Improvement Co. sends *The Virginias* the following statement of the coal, and coke operations of that company at its mines and ovens at Pocahontas, Tazewell county, Va., during the month of September, 1884, in 2,000 lbs. tons. To this we add, from page 151, the previous output of the year and so give, in the second column, the total output of coal and coke from Jan. 1 to Oct. 1, 1884.

	September.	Jan.—Oct.
Coal mined	26,673	182,054
Coal shiped	17,451	115,369
Coal coked	9,850	68,731
Coke shiped	6,246	. . .

We learn that this company is now making large shipments of its excelent semi-bituminous steam and domestic coal to Norfolk, for coastwise shipments. We have always contended that these superior Lower measure coals—those that have become known in the markets as New River coals, from the lines of the Norfolk & Western and the Chesapeake & Ohio railways, wherever they have become known will continue to be in demand; their high percentage of carbon and low one of ash give them decided advantages as a fuel for steam and domestic purposes, and for coke making, over nearly all other coals of their class that we know of,—advantages that are certain to make the demand for these coals a steady and constantly increasing one.

General freight agent Chas. P. Hatch, of N. & W. RR, writes us: Specially refering to the shipment of coal for the coastwise trade. This business is now regularly established and we are making deliveries over our present pier at Norfolk. Of course this business will be much benefited upon the completion of the Lambert Point pier, but as far as our efforts will permit shipments are now being regularly made.

The Tagus Mill & Mining Co. of Va.—Elsewhere in this number we publish, under the head of Goochland county, a descriptive list of 30 samples of gold ores and accompanying rocks, from 8 different mines belonging to the Tagus Mill & Mining Co., contributed by Mr. Charles Willard, of Columbia, Va., the superintendent of this company. Mr. W. also sends us an interesting cross section of the "ledge," from which these samples came, which he says contains at least four distinct gold-bearing veins between its walls which are 1600 feet apart.

This company bought, three years ago, 1600 acres of land, in different tracts, in the western end of Goochland county one mile from the Fluvanna line and five miles from Columbia, a station of the Richmond & Alleghany RR. on James river, 56 miles above Richmond, and then organized a chartered developing company. There was a plain stamp mill on one of the properties purchased which obviated the necessity of erecting one. This company consists of five Philadelphia, Pa., capitalists. Ephraim Young, president; Gen. H. G. Sickel, treasurer; and Allen and Nathan Middleton and Ephraim Furland. No stock has been issued; the four properties purchased were paid for in cash and some $30,000 have been expended for lands, mining machinery, and in developments. They can now show what they have on two of their properties and are now prepared, we understand, to sell to parties wanting gold mines to work.

The Sale of Short-horn Cattle by Maj. Bentley of Pulaski county, Va., recently, realized $6,340; fifteen bulls averaged $148 each and 21 cows $208 each; 40 sheep were sold at an average of about $18 each. The farmers of S. W. Virginia purchased most of this fine blooded stock.

Classification of Eozoic and Paleozoic rocks.—In a previous issue was published, from the Smithsonian Report for 1882, an extract from a paper by Dr. T. Sterry Hunt on recent progress in geological science. Below is an extract from the same paper on the Classification of the Eozoic and Paleozoic rocks to give a better understanding of the nomenclature of these great sub-divisions as now made by the masters in geology; they are numbered in ascending order from the lowest or oldest formation upward.

1st. The Eozoic or Archæan.

1. Laurentian. (Logan and Hunt, 1854.)—Lower Laurentian of Logan. This, as originally defined by the geological survey of Canada, included a lower division of granitoid gneiss, apparently without limestones (Ottawa gneiss of Hunt), and an upper division (Grenville series of Logan) consisting of gneisses with bands of granular limestone, quartzite, and iron ores, a probable unconformity existing between the two. The lower of these may probably correspond to the Lewisian and the upper to the Dimetian of Great Britain, and it may be found desirable to adopt the name of Lewisian for the Ottawa gneiss, and to restrict the name of Laurentian to the Grenville series. Both of these are probably included in the older gneiss of the Alps.

2. Norian. (Hunt, 1871.)—Upper Laurentian or Labradorian of Logan. The hypersthenite rocks of Maculloch and Emmons, a series in which granitoid and gneissoid rocks, essentially composed of anorthic feldspars, predominate, with, however, intercalated gneisses, quartzites and limestones resembling those of the Laurentian.

3. Arvonian. (Hicks, 1878.)—The haelleflinta or petrosilex group of Sweden and Wales, consisting essentially of granular or cryptocrystaline quartzo-feldspathic rocks, often jasper-like, but becoming gneissoid or porphyritic, interstratified with more or less of argillaceous, chloritic and hornblendic rocks like those of the succeeding Huronian series, in the base of which it was at first included in North America, but from which it seems generally separated both in North America and in Wales by a stratigraphical break.

4. Huronian. (Hunt, 1855.)—The Pebidian of Hicks, and the lower part of the pietre verdi or greenstone group of Italy.

5. Montalban. (Hunt, 1871.)—The younger gneisses, leptinites, hornblendic and micaceous schists of North America and central Europe; the Upper Pebidian or Grampian of Hicks; included by Gastaldi in the pietre verdi zone of northern Italy.

6. Taconian. (Hunt, 1878.)—Primitive quartz-rock, limerock, and argillite of Eaton; Lower Taconic of Emmons. Primal, Auroral, and Matinal of Rogers, in eastern Pennsylvania; Itacolumite group of Lieber.

[In 1870, the name of Terranvan was proposed by Hunt to include the groups above numbered 5 and 6; but was abandoned by him in 1871, when the name of Montalban was suggested for 5.]

7. Keweenian.—The name of Keweenaw group, 1873, and Keweenian, 1876, was employed by Hunt to distinguish the so-called Upper Copper bearing rocks of Lake Superior, which have been shown to be younger than the Huronian and Montalban, and older than the Cambrian (Potsdam). Though they occupy a horizon not far from the Taconian, they differ widely from it in character, and constitute a distinct series whose chronological relations to the latter cannot yet be determined.

2nd. The Paleozoic.

8. Cambrian.—Lower and Middle Cambrian of Sedgwick; Cambrian and Primordial Silurian of Murchison, containing the first fauna of Barrande. Embraces in North America the Menevian or Acadian, the Potsdam and Calciferous divisions of the New York system, and the Upper Taconic of Emmons or Quebec group of Logan.

9. Ordovician or Ordovian. (Lapworth, 1879.)—Upper Cambrian of Sedgwick; Lower Silurian of Murchison; Cambro-Silurian and Siluro-Cambrian of others, containing the second fauna of Barrande. Embraces in North America the Chazy, Trenton, Utica, and Loraine divisions of the New York system.

10. Silurian. (Sedgwick.)—Upper Silurian of Murchison, containing the third fauna of Barrande. Includes in North America the Oneida, Clinton, Niagara, and Lower Helderberg, of the New York system, with the intercalated Onondaga or Saliferous group.

11. Devonian, or Erian of Dawson; the Erie division of the New York system.

12. Carboniferous.

The Staunton Spectator, our highly esteemed neighbor and cotemporary, which the census reports to be in its 62nd year, has done a good thing for itself and a better one for the wide circle of its readers, in whose homes it is looked upon as an elder member of the family, by calling to its staff Col. J. C. Shields, the former editor of the Richmond Whig and one of the best and the best informed writers of Virginia upon all questions pertaining to her economic interests, to her development, to her history—in fact to all things Virginian, which is about the same as saying to all things National. For some months past he has enriched the columns of "The Spectator," weekly, with such articles as we would like to reproduce in *The Virginias* where they could be preserved for ready and continuing reference. We are glad to have Col. Shields among us; his presence is a public benefaction.

Lexington, Va.—A correspondent of "The State," of Richmond, writes as follows of the growth of this famous and charming Valley town. May it continue to prosper:

"In spite of the depression all over the land, and the drought, house-building is going on here all the time. More than forty new houses will have been built ere the year closes, since the Baltimore and Ohio railroad entered the town, and there are not more than two vacant houses in the town. Most prominent and significant of all the improvements here is the foundry and machine shops of Jolliffe & Estill. Originally designed to be a part of the Lexington Manufacturing Company, they are now in the hands of two active young business men, who have put in the newest machinery for the manufacture of steam engines, agricultural implements, building purposes, and any castings that are for use or ornament. Orders are coming in, and some day they will rival the Tredegar works in Richmond."

What is above said of Lexington is equally true of Staunton, and of nearly every town and village in Virginia. We have never known so much building of new dweilings and business houses and repairing of old ones as has been going on this year. The State is "dressing up" as she was never "dressed up" before. The farmers are not only puting their houses in order but their farms and farm buildings as well. The cheering prospect of thrift and plenty that meets the eye all over the Commonwealth, is one cheering to the patriotic heart, and one that recalls, as a present fruition, the words of the poet Hempstead, uttered in Virginia just before the late war that desolated all her borders:

A health to Old Virginia, the land that never tires,
May He that piled her mountain tops enlarge her best desires;
And save her from the spoilers spoil and from the scorner's scorn;
Let her be Queen of States in which great Washington was born.

The Snowdon Slate Quarries.

By J. L. and H. D. Campbell.

[Illustrated by Map and Sections on page 170.]

Having been requested to make a professional examination of the Snowdon Slate quarries, owned by the Virginia Slate Mining Company of Lynchburg, Va., (Chas. E. Heald, President), we report the following as the result of our observations:

I. *Geographical Position.*—These quarries are situated near the western corner of Amherst county, in Virginia, where this county borders on the counties of Rockbridge and Bedford. The quarries have been opened on a belt of slate that occupies some of the spurs and intervening valleys which skirt the southeastern base of the Blue Ridge mountains. The same slate belt is cut by the James river, and by the Richmond and Alleghany Railroad, a few miles below Balcony Falls station.

The accompanying local map, compared with any good general map of Virginia, will give the reader a clear idea of the position of the quarries, and the property of which they form a part.

II. *The Topography* of the property, as to its leading features, is also given on the map. The Blue Ridge forms a conspicuous boundary on the northwest, rising to a height of 2,500 or 3,000 feet; and from its base run down numerous spurs and intervening ravines by which the waters of the mountain are collected into Rocky Row creek, which enters the James river at Rope Ferry station (Snowdon P. O.), and into Otter creek which reaches the river about four miles lower down. These streams are important features of the property, in as much as they both have their sources near the quarries, and both have eroded valleys that afford available lines of transportation for bringing the slates to the margin of the river, the grade down each route being quite uniform, and nowhere too high for a railroad track.

At present the slate is carried down the valley of Rocky Row creek on wagons over a distance of three and a half miles; but a railway track could be readily substituted, by which the products of the quarries could be delivered directly upon the track of the Richmond and Alleghany Railroad at Rope Ferry station.

The main quarry (A on map), from which the greater part of the slate has been hitherto obtained, is located on the face of an elevated spur of the mountain; but recent explorations lower down in the valley have developed slate of fine quality, and in very great abundance, where a considerable number of quarries may be opened, and where both mining and shipping will be more convenient than at the other locality.

Northeast of Slaty gap the general slope of this property is towards the valley of Otter creek, on the banks of which a quarry (B) was opened some years ago to obtain slate for local purposes. The quality of slate from this point proved to be excellent; and numerous quarries might be opened in the same valley, and find an outlet for their products along the valley to the banks of the James.

Thus, as stated above, the physical features of the region divide the slate belt into two somewhat distinct areas, both of which are extensive, and both capable of yielding immense quantities of slate. In both regions the quarries may be opened so high as to be entirely above the beds of the adjacent streams, and so high as to secure natural drainage for their accumulating waters.

III. *Geological peculiarities* in all mineral regions aid very much in determining the position and extent of their resources.

At Balcony Falls as at other points along this range of mountains, we find the *core* of the Blue Ridge proper to be a mass of igneous and metamorphic rocks—the oldest in the geologic series, and hence called "Archaean." Against the northwestern slope of these rest very extensive beds of alternating slates, sandstones and conglomerates, constituting what is known as the "Potsdam or Cambrian" group of the Lower Silurian age. The rocks of this group form a bold escarpment along the crest of the Blue Ridge for some distance between the Falls and the quarries, while the outcrop of Archaean rocks beneath constitutes the eastern slope of the mountain for a corresponding distance. Farther down the slope sandstones again appear followed by the slates of the Snowdon belt.

From a casual examination of these sandstones and slates along the eastern flank of the mountain, made some years ago, we concluded, chiefly from their highly metamorphosed condition, that they most probably belonged to the upper divisions—known as "Huronian"—of the Archaean rocks. Such seems also to have been the view of other observers, including Prof. Rogers. But more careful and minute examinations recently made, on both sides of the James river, place a considerable belt of sandstones and slates along the eastern flank of the mountain, (including the Snowdon belt,) in the Cambrian group.

This conclusion has been established beyond question by the discovery of sandstone beds dipping under the Snowdon slates, and abounding in the Scolithus fossils (supposed to be worm borings) so characteristic of the Potsdam sandstones of the Blue Ridge range. We thus find these slates to be of the Lower Silurian age—the same age as those in some of the best quarries of other regions.

The accompanying section (No. I.) will serve to show the main features of the geological structure in the region of the slate quarries. The section represents an ideal vertical plane, supposed to cut the several kinds of rocks along the line C—D on the map. The igneous and gneissoid rocks are marked thus v v v v. The sandstones are dotted and the slates ruled. That portion of the Cambrian beds, thrown over to the eastern side of the axis of the Blue Ridge has been much more highly metamorphosed than what is left on the western side; i. e., it has been subjected to more intense heat under heavy pressure. To this fact is due in a great measure the high quality of the slate under discussion.

[We have not yet had time to trace out precisely the southeast border of this newly discovered Cambrian belt, but that is more of a scientific than a practical point, and will command our attention at an early day and in another connection. See *The Virginias* September, 1884, page 145; also *American Journal of Science* September, 1884.]

What is called "slaty cleavage"—that property of a slaty mass which permits it to be split into slabs or tiles of any desired thickness—is due to a high degree of heat under strong pressure, acting in lines at right angles to the cleavage planes. Sometimes the planes of slaty cleavage coincide with the planes of original beding or stratification, but more frequently perhaps the cleavage planes are more or less oblique to the planes of strata, as is the case in the Snowdon quarries. This state of case is illustrated by section No. II. representing the internal structure of the main quarry. The waving and somewhat contorted lines, a—b, indicate the original stratification, and mark the limits of the several beds as more or less separated by foreign material, such as silica, feldspar, carbonate of lime, &c., which constitute the "ribbons" of the slate quarries. The fine parallel straight lines, c—d, indicate the superinduced slaty cleavage—a result of metamorphism.

IV. The map shows the *extent of area* occupied by the slate on the company's property. It covers a belt nearly parallel with the Blue Ridge, widening towards the north-

east into a shape somewhat resembling a half-open fan. On this property it is approximately three and a half miles long, with an average width of half-a-mile. Its boundary is indicated by the broken line, (—— - —— - —— -), on the map.

The *thickness* of the slate bed cannot be determined with any great degree of certainty. The only data, on which we can base an estimate, are the heights of the slate ridges above the adjacent ravines, the exposures of beds in the quarries, and the thickness and dip of the strata. This last factor which in many cases is highly valuable, is so variable here as to be unreliable for accurate calculations. If we take the height of the *uneroded* strata above the bottoms of the *eroded* ravines, we have at some points, about five hundred feet, and from the character of the slate exposed at low points, and from the geological structure of the slate-belts, and its surroundings, we may safely infer that there is good slate for several hundred feet below the bottom of the lowest quarry yet opened, which means practically an inexhaustible supply. It is enough to know certainly, as we do, that a large number of quarries can be at once opened, at points where there is good slate, where mining will not be difficult, aud where many years of work will not exhaust the supply.

V. *The quality* of the slate from these quarries has been fully established by both *scientific* and *practical tests*. We have subjected samples of them to the severe crucial tests of the laboratory, and to careful examination under the microscope. All these trials indicate the material and physical structure which characterize slates of high grade. Specimens exposed to the influence of the weather for years, about the quarries and elsewhere, show no symptoms of disintegration.

The *practical value* of the slate for roofing has been verified in Lynchburg, Lexington and other places; and it is gaining favor wherever it becomes known. Workmen who have handled it speak in most favorable terms of its workable qualities.

VI. *Transportation* and *markets*.—Reference has already been made to the facility with which slate can be brought down to Rope Ferry station, on the R. & A. RR., from which point it can be shipped as may be desired.

Slate quarries are not numerous in the South and West, and there are none from which the extensive and growing demands in those regions can be more conveniently supplied than from the Snowdon quarries. For local demands, as at Lynchburg, Lexington or Staunton, or any other points on the lines of the R. & A. and the Balt. & Ohio RRs., the slate can be shipped in quantities to suit individual purchasers. In larger quantities it may be shipped by the car-load, and thus run through to the southern and southwestern markets, such as Charleston, S. C., Savannah and Atlanta, Ga., Mobile and Montgomery, Ala., and New Orleans, La. In like manner it may be shipped to Clifton Forge by the R. & A. RR., and thence by the Chesapeake & Ohio to the western and northwestern markets, as Cincinnati, Louisville, St. Louis, Chicago and other cities; or from Lexington, Va., to all points reached by the B. & O. Railroad system.

Hence we see that these quarries occupy a central position for a very wide range of markets; and the enterprising company having control of them are enlarging their operations, so that they will soon be prepared to meet the growing demand for the products of their capital and industry.

VII. It may be well to add, in conclusion, that the large tract of land owned by the company will always afford an ample supply of timber for all ordinary building purposes, for railroad ties and for fuel.

The employees and their families have already formed the nucleus of a pleasant little village along the mountain valley near the quarries.

After a careful professional examination of the Snowdon property, we offer the foregoing as a summary of the conclusions reached in regard to its present condition and future prospects.

J. L. Campbell,
Prof. Chem. and Geol.
H. D. Campbell,
Ass't Prof.
Wash. & Lee University,
Lexington, Va., May, 1884.

The woods of Virginia are probably more numerous in kind than those of any other state in the Union, simply because she has within her borders areas of all the geological formations found in any part of the Union and the ranges of elevation—from tide-level to near 6,000 feet—that furnishes the climatic conditions for their growth. We see it stated that North Carolina has on exhibition over 270 specimens of different kinds of wood from growths indigenous to that state. Virginia could make an exhibit of an equal or greater number if she would take half the trouble and pay half the money for the purpose that the "Old North state" has.

An illustration of the wealth of Virginia's wood flora is at hand in a recent letter from Prof. Seamon, of the Miller School of Albemarle county, in which he writes concerning the exhibit that grandly doing poor men's school will make at the New Orleans exposition and says, among other things: "We will have a collection of woods, collected and prepared by our boys, representing 33 species all of which grow wild upon our farm. It does not include all the woods that grow wild in Albemarle county and I have not the time to make a collection of that kind in time for the opening of the Exposition. We also have pressed specimens of almost every kind of wild flower growing on our farm which we will exhibit. If I have the time I should like to exhibit specimens of all our native woods. I am preparing my specimens in two ways. In the first I have blocks sawn from the trunk 10" long, 2" thick, and of variable width, 2" to 8". The bark is left on one side and the others are polished and oiled. In the second I have had frames made of the twigs with the bark on; at each corner is a transverse section of a limb 1.5" in diameter. The back to the frame is a polished piece of wood from the tree. In these frames I propose to put the pressed leaves of the tree, prepared by drying and coating with a thin layer of paraffine. In some cases the flower and fruit will accompany the leaf."

Since the above was written Prof. Seamon, properly equiped with transportation, has been engaged in a thorough exploration of Albemarle county for the purpose of collecting her minerals and other products for New Orleans, and we would not be surprised if he finds more than a hundred varieties of woods in that county, for he states that he obtained *33 from one farm*.

The North Carolina Exposition, at Raleigh, says the Richmond, Va., "State," is spoken of by every one who has seen it as one of the most comprehensive exhibits of the kind that has ever been held in the United States. North Carolina is rich in mineral and agricultural resources, and her forests are exceedingly valuable. Virginia should have an exposition next year by all means, so that the world might see what we have in the way of material wealth."

We would add, why postpone Virginia's exhibit to next year when she has such an admirable opportunity to begin this year by making a grand exhibit of her natural resources at New Orleans, which can be returned and form the nucleus for a larger and grander exhibit at our State fair next year, and thus begin a permanent exhibition at Richmond such as North Carolina has now already open at Raleigh.

Virginia Minerals for the N. O. Exposition.

(Continued from page 158.)

Below we continue the publication of the list of Virginia's minerals collected by Assistant U. S. Commissioner Jed. Hotchkiss, in charge of ores, minerals, etc., grouped by counties, giving consecutive numbers to those collected from each county followed by the name and address of each contributor and concluding with the general collection number of the commissioner in charge.

Louisa.

The following valuable contributions, 6 boxes full, are from the Arminius Copper mine, east from Tolersville station, Ches. & Ohio Ry. Contributed by W. H. Adams, M. E., engineer and mine manager. (85).

1. Granular pyrites, high grade, from surface of vein near No. 1 shaft; contains about 50 per ct. of sulphur.

2. Granular pyrites from principal vein opened 550′ long, 350′ deep and averaging 20′ wide; to depth of 200′ consists of moderately hard ore through which water percolates and disintegrates the ore and produces "granular" or "sandy" particles. Below the action of water the vein is compact and exposure for years does not change it. Analysis gives: Sulphur 49.57; iron 43.62; copper 1.50; zinc, lime, and magnesia 1.10; silica 4.23, and arsenic none. This class of ore is shiped North in large quantities for the manufacture of sulphuric acid in both the "shelf-burners" and the "Spence mechanical furnace."

3. Iron pyrites containing gold, silver, etc This is a coarse-grained crystal throughout the deposit, resembling more the deposits in the Territories where such indications lead to the precious metals Is from the upper levels of shaft No. 2, in vein about 12′ wide with good walls.

4. Iron pyrites containing copper, gold and silver. From No. 2 shaft 120′ from surface. Deposit irregular in shape, explored only at centre of greatest dislocation of strata, where worked over 20 years ago searching for copper. Two months labor in cleaning out old shaft and levels revealed large deposit of this ore which will be utilized in the general processes for treatment of cuprous ores at this mine.

5. Iron pyrites, containing copper, from No. 1 shaft, 250′ level, where vein is 37′ wide between slate walls. In this vein the copper sulphides are distributed through 12′ of width; they are known to extend from the 200′ level to the 350′. Analysis gives: Copper 3 to 12, iron 38 to 43. sulphur 34 to 42, silica 4 to 17, lime 1 to 3, and magnesia 0.3. to 1.2 per cent.

6. Massive iron pyrites containing zinc, found in small quantities along the walls of several veins in Louisa county, viz: At the Arminius in beds of pyrites; at the Jenkins tunnel of Sulphur Mines Co. on foot walls of pyrites veins; in small shaft of Lennig at Allie Cooper mines combined with lead. At Arminius mines and Jenkins tunnel it is separated from pyrites by hand and thrown away, the quantity being too insignificant to save; nothing has been done to develop its extent at the other places named.

7. Black oxide of copper, "fines," from upper portion of "hard white" vein. Not utilized now; will be worked with copper sulphides from lower portion of mine. Not found, so far, below 200′. Analysis gives: Copper 4 to 20, sulphur 20 to 32, iron 20 to 28, silica 9 to 23.

8. Massive hard-white iron pyrites, from veins or beds from 8′ to 40′ thick; mines easily and cheaply; breaks readily, on true lines of cleavage, into small sizes for burning in kilns; is shiped to Bridgeport, Conn.; Tremley Point, N. J., and other places, but classes too high for ordinary use. About 10,000 tons already shiped or on dumps for shipment. Analysis: Sulphur 51.649, iron 46.870, copper 0.200, silica 1.278, arsenic none, =99.997.

9. Granular white-iron pyrites from surface workings of No. 2 shaft near N. E. end of property. Vein is very wide, 20′ to 30′, and thousands of tons can be shoveled out without blasting. On exposure it changes rapidly to peroxide and will make one of the finest natural paints ever used. After treatment in "Spence furnace" this class of cinders can be used for making steel "direct," without making it first into pig-iron, or it can be used for paints and pigments at once. Analysis: Sulphur 51.30, iron 47.60, moisture, etc., 1.10, =100.

10. Pyrrhotite and chalcopyrite, from No. 1 shaft 150′ from surface, from centre of vein where that is 23′ wide; copper shows through entire width and will average fully 3 per ct. Analysis: Copper 4.207, iron 45, sulphur 39, silica, magnesia and lime 11.80, =100.

11. White iron pyrites from foot wall of No. 1 shaft in vein 23′ wide.—Granular pyrites are found, invariably, nearest the surface along the entire belt or deposit on this property. Millions of tons of ore carrying above 30 per cent of sulphur and rich in copper and iron, are here exposed on the line of ore pits for nearly a mile in a N. E.—S. W. direction; much of it contains 50 to 52 per cent of sulphur.

12. Garnet slate and garnets in place, from main pyrites vein in No. 3 shaft. Slabs of this slate, filled with garnets, are frequently met with 6 ft. square. The extent of this bed has not been proven.—The formation of red and black garnets and their position in the vein are equally interesting questions.

13. Garnets and magnetite, crystals in place, from No. 1 shaft 125′ from surface. The deposit or vein is split by a wedge-shaped "horse" of this material, close to which the best copper ore is found.

14. Manganiferous iron ore from a prospecting hole; only a few tons mined and shiped.

15. Iron ore, hematite, from surface of the pyrites veins of Arminius and Sulphur Mines companies' properties.—All the pyrites deposits above the water level of the principal creek near the mines have been changed by oxidation into the various ores of iron which, for the past 40 years or more, have been mined and smelted into charcoal pig at the adjacent Victoria furnace. Probably 500,000 tons of these iron ores have been taken from the surface of these pyrites veins, leaving mining pits and openings for over four miles along the length of these veins. Invariably, under the iron cap, the pyrites are found, but in veins of varying width. The principal iron pits are now owned by the "Arminius" and the "Sulphur Mines" companies whose developments, says Mr. Adams, really cover all the valuable deposits of this district.

As this iron ore was made by the *natural oxidation* of the sulphides *in place*—that is surrounded by slates, silica, clay, etc.,—it must have been rendered by these, more or less impure for smelting purposes. The pyrites as at present mined are easily cleaned from all foreign matter and therefore, when *artificially oxidized* in the process of roasting for sulphuric acid, they must leave as a residue the best of iron oxide suitable for steel making dirict.

It is now intended to utilize these pyrites: First, for the manufacture of sulphuric acid; Second, for the extraction of copper, gold and silver; and Third, to use the iron oxide in various ways, as for pigment, etc.

Giles.

From Capt. Cr. R. Boyd, (See under Wythe).

1. Fossil, Rusophycus bilobatus, from No. I on Little Stony creek. 44. (142).

Pulaski.

From Capt. C. R. Boyd. (See under Wythe).

1. Brown iron ore, brilliant, from Rich Hill mine and vicinity, Cripple Creek region, lands of Forney, Calfee, and Graham, Robinson, Tate & Co. 9. (141).

Russell.

From Capt. C. R. Boyd. (See under Wythe).

1. Splint coal from Lewis creek. 58. (143).

Grayson.

From Capt. C. R. Boyd. (See under Wythe).

1. Magnetic iron ore from 3′ vein, 2.5 ms. N. from Oldtown, near New river; metalic iron 70 per cent. 6. (144).

Bland.

From Capt. C. R. Boyd. (See under Wythe).

1. Brown iron ore, large deposit in No. III; lands of S. H. Newberry. 27. (145).

2. Specular iron ore, fine quality, from base of No. III lands of Newberry and others. 28. (146).

3. Brown iron ore cubical pseudomorph after pyrites; land of Harman Newberry. 29. (147).

4. Iron ores from No. X from S. foot of Brushy mn. near, Sharon Springs; lands of Newberry and others. 30. (148).

5. Coal from No. X Proto-carboniferons, near Sharon Springs; lands of Newberry, Harman and others. 31. (149).

6. Red and brown iron ores from No. VIII slates, from Round mn., Hunting-camp and Wolf creeks. 32. (150).

Brown iron ore, compact, from rocks overlying No. VII, Oriskany; good for basic process and for cuting into setings; analysis by by A. S. McCreath. 33. (151).

8. Fossil, Petraia corniculum, from No. III. 44a. (152).

9. Red and brown iron ores, splendent, from underlying rocks of VII, Round mn.; large deposit; 56 per cent. met iron, 0.08 phosphorus; lands of Peery & Boyd. 34. (153).

10. Marble, nearly white, from land of Sam. H. Newberry. 54. (156).

11. Mineral water from Sharon Alum and Chalybeate spring. 60. (157).

12. Manganese, silicide of, from Round mn., lands of Peery & Boyd. 37. (158).

13. Brown iron ore, fibrous, from large beds in Round mn.; lands of Peery & Boyd. 38. (159).

14. Fossil iron ore from from 20″ bed of No. V in Round and Garden mns.; lands of Peery & Boyd. 39. (160).

Wythe.

The following list of minerals, etc., from Wythe county, has been furnished by Capt. C. R. Boyd, M. E., of Wytheville, one of the Virginia Commissioners to New Orleans, from the collection he is now making for the Virginia exhibit at New Orleans. The first of the appended nos. is that of Capt. Boyd's list; the second, in parenthesis, is that of the Virginia exhibit.

7. A series of lead, zinc, iron and barytes ores illustrating Boyd's sections at Wythe lead and zinc mines and at Ivanhoe furnace of Hendricks Bros. 7. (98).

8. Zinc ores from Falling Cliff mine of D. S. Forney & Co.; analysis by Fred. P. Dewey. 8. (99).

9. Brown iron ores and Turgite from Irondale, Slaughter, Dunn & Co., Ravens-cliff and Speedwell deposits, Cripple Creek basin, from beds from 20′ to 120′ thick. 10. (100).

10. Pig metal from Ivanhoe furnace of Hendricks Bros., Cliff St., New York. Stands breaking strain of over 41,000 pounds. 11. (101).

11. Copper pyrites from S. spurs of Lick mn., near Wythe Gleaves', containing 30 per cent of copper. 12. (102).

12. Potsdam, No. I, sandstone, from Scolithus bed, Lick mn., near Wytheville. 13. (103).

13. Brown oxide of iron and manganese oxide from 20′ bed of W. A. Stuart's 15,000 A. tract, Lick mn. 14. (104).

14. Red iron ore, semi-magnetic, from 9′ bed of Frank Blair, 2 ms. N.W. of Wytheville. 15. (105).

15. Brown iron ore from Ro. Crockett lands, S. spur of Lit. Walker mn. in No. X. Ore contains 50 per cent met. iron and 0.80 of phosphorus. 16. (106).

16. Kidney or hollow iron ore, black-band, from outcrop 18″ thick, in No. X, from Stony fork; analysis by Dr. Thomas Egleston. 17. (107).

17. Bituminous coal of No. X, from Stony fork; analysis by Dr. Thomas Egleston. 18. (108).

18. Coke made from the above coal. 19. (109).

19. Red and brown iron ores from black slates of No. VIII; from lands of Boyd, Trinkle, Stearns, Umbarger, Thompson, Hedrick and others, S. foot of Big Walker mn. 20. (110).

20. Clay iron ore from base of black slates of No. VIII. 21. (111).

21. Flint from Upper Helderberg, showing zinc blende, from S. foot of Big Walker mn. 22. (112).

22. Brown oxide of iron from 18′ of No. VII, Oriskany, S. slope of Big Walker mn. 23. (113).

23. Brown iron ore from No. VII, Oriskany, from lands of Boyd, Stearns, etc., Walker mn.; analysis by J. Blodget Britton. 24. (114).

24. Brown shale iron ores of No. V, from some locality as above. 25. (115).

25. Red shale iron ores of No. V, from same locality as above. 26. (116).

26. Fossils, spirifers, etc., from No. IX, from Crockett Cove, Little Walker mn. 45. (117).

27. Fossil coal plants from Proto-carboniferous rocks, No. X, Stony fork. 46. (118).

28. Variegated marble, from lands of Umbarger and others, 3 ms. N. W. from Wytheville. 47. (119).

29. Calcium carbonate. 48. (120).

30. Limestone, No. II. 49. (121).

31. Calcium fluate, fluor-spar, from Reed creek, 3 ms. W. from Wytheville. 50. (122).

32. Mineral water from Wytheville; qualitative analysis by Dr. J. W. Mallett. 59. (123).

33. Grindstone rock from base of No. X, Stony fork of Reed creek. 52. (124).

34. Whetstone rock, from No. IX, Old red sandstone series, from Stony fork. 52. (125).

35. Fine hone grit from lands of Boyd, Stearns, and others, S. slope of Big Walker mn.; said to be equal in quality to the Scotch. 53. (126).

36. Manganese oxide from Crawford's. 56. (127).

Carroll.

From Capt. C. R. Boyd. (See under Wythe.)

1. Copper carbonate and pyrites, in silicious gangue, from Peach bottom vein at Dobyns. 1. (128).

2. Iron and copper pyrites from beded vein 28′ thick and 20 ms. long, near Cranberry Plains; contains 43 per ct. of sulphur; Clayton & Williams, Baltimore, owners. 2. (129.)

3. Copper sulphuret, same locality, etc., as above. 3. (130).

4. Iron ore, hydrated peroxide, from cap of pyrites beded vein, same place as 1 and 2 above. 3. (131).

5. Native copper and gangue from Sutphin mine; Clayton & Boyd, Wytheville, owners; averages 5 per ct. of metal; 6′ between walls. 5. (132).

6. Mineral water from Grayson Sulphur springs. 6. (133).

Washington.

From Capt. C. R. Boyd. (See under Wythe).

1. Iron ore, semi-magnetic, from Gollaher mine. 43. (134).

2. Mineral water and "iron and alum mass" from Seven Springs. 62. (135).

Montgomery.

From Capt. C. R. Boyd. (See under Wythe).

2. Native gold, from Stone's. 42. (136).

Floyd.

From Capt. C. R. Boyd. (See under Wy the).

1. Red iron ore from Ultizer's ford. 41. (137).

Smyth.

From Capt. C. R. Boyd. (See under Wythe).

1. Red iron ore, from 6′ bed, many miles long, head of Comer creek, on Smyth-Grayson line. 40. (138).

2. Marble from Hezekiah Harman's land. 55. (139).

Tazewell.

From Capt. C. R. Boyd. (See under Wythe).

1. Red shale iron ore, fine quality, from Paint Lick mn. 57. (140).

1. Semi-bituminous coal; a complete section 12 ft. thick of bed No. 3 of No. XII, the Lower coal measures of the Carboniferous, from the Pocahontas mine of the S. W. Va. Improvement Co. From H. Wickham, Roanoke, Va., Vice-president. (81).

2. Semi-bituminous coal; samples from Pocahontas mine, as above. (82).

3. Coke made at Pocahontas from above coal. (83).

Goochland.

The following 30 samples of gold ores, from eight different veins on lands of the Tagus Mill & Mining Co. of Va., were furnished by Mr. Charles Willard, Supt., of Columbia, Va. (87).

I. *From House vein.*—1. Specimen of outcrop.—2. Specimens from water-level, 14′ deep. This vein is 16″ thick and assays from $28 to $40 to the ton.

II. *From Mary vein.*—3. Specimen of outcrop.—4. Specimen from open cut near surface; assays $14. 5. Specimen from open cut 8′ deep; assays $10; vein 12″ thick.

III. *From Oak Hill vein*, water-level 36′ deep.—6. Specimen from 4′ vein above water-level.—7. Specimen from water level.—8. Specimen from below water-level.—The average yield from quartz and slate in this level is $10; run of batteries shows same. This vein is 6′ to 12′ thick and has over 300′ of headings and cross cuts driven in its level.

IV. *From Oak Hill Tunnel*, 400′ long; drains Oak hill to 75′ below the summit, and 26′ below upper level; is connected by shaft to upper working.—9. Sample of hanging wall 18″ thick.—10. Section of vein next below 9.—11. Section of vein next below 10.—12. Section of vein next below 11.—13. Bottom of vein below 12.—14. Piece of boulders weighing 40 lbs in a brown gravel vein under 13; a shaft sunk 6′ below bottom of tunnel did not go through it. The whole vein at this point is now 14′ thick and 75′ from the surface. The boulders assay $6; the gravels contain some pure gold.

V. *The Young shaft.* 15. Laminated rock from 70′ below surface, from hanging wall of ledge 1600′ wide.—16. Layer of slate 6″ thick between between 15.—17. From 10″ quartz vein in 16. Prof. Silliman, of Yale College, says this is next to the oldest rocks known and came from a great depth.

VI. *The Fisher vein.*—18. Surface cropings.—19. From water-level, 14′ down.—20. From bottom of vein.—Vein 20″ thick close to above foot wall. Open cut assays $14 to $20.

VII. *The West vein* in Gilmore mine.—21 and 22 from a 10′ cut.

VIII. *The Main vein.*—23. From croping on top of hill.—24. From 20′ deep.—25. From 30′ deep.—26. From 40′ deep.—27. From 50′ deep.—28 and 29. From 60′ deep.—These are from open cuts from top to bottom of hill; 24 and 25 assay from $24 to $42; 26 and 27 assay from $40 to $75; 28 and 29 if concentrated and roasted will assay $150 to $200 gold and and about $9 silver per ton.—This vein is from 4′ to 6′ thick and has natural drainage to the depth of 175′—30. Sample of choice cropings found everywhere along the course of the veins.

Rockbridge.

7—8. Iron ores, brown, from No. VII and red shale from No. V, from Guy Run Iron lands of E. A. Packer of New York City. From Harman Lerner, lessee, Goshen. (92).

9. Tufaceous marl, lime carbonate, deposit from Marl run at Lyle's Plow factory, near Midway. Capt. Hugh F. Lyle, Staunton. (168).

10. Limonite, brown iron ore, from upper shales of Potsdam, No. I, at Fulton ore bank, Vesuvius iron property, 1.5 ms. S. W. from Vesuvius station of Shenandoah Valley RR.; Echols, Bell & Catlett, Staunton, owners. (161).

11. Limonite, brown iron ore, massive block, from great outcrop of Donald bed, in Dogwood hollow. 3 ms, N. E. from Vesuvius station, S. V. R. R.; and from lower Potsdam, No. I, shales; Echols, Bell & Catlett, Staunton, owners. (162).

12—25. The following 14 specimens are from the cabinet of Dr. E. A. Gibbs, Lexington, obtained through Mr. W. H. Barclay, Lexington, receiving agent for the Va. collection, viz:

12. Variegated pink marble.—13. Limestone.—14. Coraline limestone.—15. Gray limestone; contains 97 per cent. lime carbonate.—16. Light gray limestone; contains 96 to 98 per cent lime carbonate.—17. Blue limestone, marble, from near Natural Bridge.—18. Black marble, from near Lexington.—19. Black marble, from near Goshen.—20. Yellow variegated marble.—21. Brown marble.—22. Stalactitic marble, found in large masses.—23. Yellow variegated marble, from stalactitic mass near Rockbridge Baths.—24. Variegated marble from Thompkins'.—25. Black marble, from Steele's. (169).

26. Red shale iron ore, from the Clinton, No. V. beds of —— —— mine, N. W. side of Little North mn., S. E. from Bell Valley station, Chesapeake & Ohio Ry., from land of Echols, Bell & Catlett, Staunton. (170).

27. Limonite, from iron ore, from Oriskany, No. VII, from Fridley mine, N. W. side of Little North mn., eastward from Goshen station of Ches. & Ohio Ry., from lands of Echols, Bell & Catlett, Staunton. (171).

Albemarle.

The following minerals have been collected by Prof. W. H. Seamon, of the Miller School, Crozet P. O. These, and others to be collected from Albemarle by Prof. S., will be placed in trays, with compartments, made of native woods by the boys of the Miller School, and the localities from which they were obtained will be indicated on a map of Albemarle county, prepared at this school.

1. Species of granite from near North Garden station, Va. Mid. RR. (173).

2. Magnetic iron ore from Mrs. Martin's land near North Garden, mine formerly worked. (211)

3. Soapstone, cut samples, from Albemarle Quarry, 5 ms. S. E. from North Garden station. (212).

4. Iron ore, specimens from Yates' farm near Albemarle Quarry. (213).

5. Slate highly charged with graphite, same locality as 4; probably valuable. (214).

6. Igneous Diorite; a parallelopidedon from dike near Faber station, Va. Mid. RR.; shows peculiar manner in which this rock weathers. (215.)

7. Mica schist from Faber Lead mines. (216).

8. Mica schist, another variety from same place. (217).

9. Ores and minerals of various kinds, 6 or 7 specimens, from Faber Lead mine. (218).

10. Slate charged with micaceous iron ore from Norvell's farm, near Howardsville. (219).

11. Brown hematite iron ore, float, from same place as 10. (220).

12. Manganese ore from same place as 10. (221).

13. Puddingstone conglomerate, from Howardsville. (223).

14. Red sandstone from near Howardsville. (224).

15. Felsite, from Israel mn. (225).

16. Blue quartz, from Israel mn. Thin sections of this show Rutile. (226).

17. Massive white quartz from Miller School farm. (227).

18. White quartz, filled with Muscovite, from Israel mn. (228).

19. "Calico" rock from North branch of Mechum river. (229).

20. Hydro-mica slates, from Miller School farm. (230).

21. Quartz crystals from Miller School farm. (231).

22. Oxide of iron, pseudomorph after pyrite, from various parts of county. (232).

23. Ilmenite, from Israel mn. (233).

Prof. Seamon, from his examination, is inclined to the opinion that Faber's *lead* mine should be called a *zinc* mine, as it is probable the latter predominates; this he will determine by analyses.

Prince Edward.

1. Fire clay from land of Wm. T. Barrett. (174).

Montgomery.

2. Gold bearing quartz, placer gold, and gold gravels, from Brush creek. Wm. H. Harman, Little River, Floyd county. (177).

James City.

1. Box of Marl, phosphatic green-sand, from "The Grove," or Carter's Grove, from which Carter's Grove Fertilizer is made. From P. W. Hinton, Grove P. O. (178).

Goochland.

31. Gold in sulpherets of iron and copper; from Wm. F. Kirtley of Belzora Gold mine, Goochland county. (334).

Shenandoah.

1. Limonite and other iron ores, mainly from No. V, Clinton; limestone, No. VI, Lower Helderberg; charcoal, pig iron, etc.; from mines of Columbia and Liberty furnaces of Columbia-Liberty Iron Co. in North mns., on Stony creek, W. side of The Valley. W. D. Pollard contributor. (165).

2. Limonite and other iron ores, mainly from No. V; limestones, No. VI; charcoal pig iron of various grades; manganese sandstones, etc., from Dr. Frank King, Van Buren Furnace, Cedar Creek valley west of Little North mn. (175).

3. Iron ores, limestone, etc., from Henrietta furnace, head of Stony creek west of Lit. North mn. Mrs. A. J. Myers, Shenandoah Alum Springs. (176).

Fluvanna.

Gold in sulphurets of iron and copper; from Wm. F. Kirtley, Belzora Gold-mine, Goochland county. (235).

Louisa.

16. Gold in sulphurets of iron and copper; from Wm. F. Kirtley, Belzora Gold-mine, Goochland county. (236).

Wythe.

The following are from Capt. C. R. Boyd:

37. Sandstone with Scolithus linearis, from Lick mn. range. This sandstone is largely used for backing and hearthstones in blast-furnaces. 74. (237).

38. Sandstone for glass-making, from Lick mn., lands of Stuart and others. 75. (238).

39. Lead sulphuret from lands of Mr. Price near Ivanhoe furnace, New River region. 76. (239).

40. Iron ores from lands of Lobdell Car-wheel Co., of Wilmington, Del., from northern outcrop of Cripple creek—New River ore basin. 77. (240).

41. Iron ore, brown, from Simmerman's, Cripple Creek region. 81. (241).

Carroll.

From Capt. C. R. Boyd.

7. Copper and iron pyrites, with copper carbonate and gangue, from Dr. H.Clark's leases; from ore-bands southern side of Floyd and Carroll, from Laurel region. 79. (242).

Floyd.

From Capt. C. R. Boyd.

2. Terra-cotta clays with soapstone, from Dr. H. Clark's leases, corner of Floyd, Carroll and Patrick counties; in bands runing through south side of Floyd and Carroll counties. (243).

Grayson.

From Capt. C. R. Boyd.

2. Magnetic iron ore from beds of Slaughter, Dunn & Co., 3 ms. northwest from Old Town. 80. (244).

Clarke.

The following specimens were contributed by Mr. A. E. Randle, of Luray, Va., from the "Berryville" mines in deposits in the Valley limestone, No. II, near line of Shenandoah Valley Railroad, owned by him; he reports them as from beds averaging 12' thick; that they yield, on an average, by analyses, 56.076 metalic iron, 0.126 phosphorus and 0.063 sulphur; and that he is now shiping about 1000 tons of them per month to the Duncannon Nail Co., Duncannon, Pa., and to the Danville Furnace Co., Danville, Pa.

1. Limonite iron ore from Mine No. 1, the "Birchel," 3 ms. S. E. from Berryville. (420).

2. Limonite iron ore from Mine No. 2, the "Morgan," ½ m. S. W. from 1. (421).

3. Limonite iron ore from Mine No. 3, the "Moore," ¾ m. S. W. from 3. (422).

4. Limonite iron ore from Mine No. 4, the "Wilson," ½ m. S. W. from 3. (423).

5. Limonite iron ore from Mine No. 5, the "Griffith," 1 m. S. W. from No. 4. (424).

Warren.

1. Limonite iron ore from "Iron Mountain" mine of Maris & Randle, of Luray, Va., 3 ms. E. from Front Royal in Potsdam, No. I, shales.—Mr. Randle reports that this is from a large deposit having 90′ breast of lump and wash ore that yields 53.384 per cent. met. iron, 0.245 phosphorus, and 0.073 sulphur, and that 50 tons of this ore are now daily shiped to Danville Furnace Co., Danville, Pa., of which Co. Jno. M. Maris, of Maris & Randle, is secretary and treasurer. (425).

Alleghany.

The following specimens from the furnace and mines of the Low Moor Iron company of Virginia, Low Moor station of Ches. & Ohio Ry., Col. H. W. Goodwin, Managing Director, were collected by Mr. James D. S. Chalmers of Low Moor:

2. Limonite iron ore, lump, from company's mine in No. VII, Oriskany. (93).

3. Limonite iron ore, washed, from company's mine in No. VII, Oriskany. (180).

4. Limestone, No. VI, Lower Helderberg, from company's quarry No.1; used for flux in Low Moor furnace. (181).

5. Coke made at Low Moor furnace, in company's ovens, and used in that furnace. (182).

6. Coal, from No. XII or Lower coal measures, from New River field of W. Va., on Ches. & Ohio Ry., from which above coke was made. (183).

7. Sand from Shadwell, Albemarle county, Va., used for pig or casting bed at Low Moor furnace. (184).

The following are samples of the coke pig irons made at Low Moor furnace from the above Oriskany or No. VII ores.

8. No. 1 foundry pig. (186).—9. No. 2 foundry pig. (187). — 10. No. 1 mill pig. (188).— 11. No. 2 mill pig. (189).— 12. Close mill pig. (190).— 13. Silvery pig. (191).— 14. Mottled pig. (192).— 15. White pig. (193).— 16. Part of "salamander" blown from furnace "well" with "Atlas" powder after blast No. 2 of Low Moor furnace. (194).

Wise.

The following specimens of coal, iron ores, and marbles were collected by Gen. John D. Imboden of Goodson, Va., (Bristol P. O. Tenn.), who gathered and prepared them for exhibition at a very considerable expenditure of time and money. Analysis will be given hereafter:

1. Coking coal, a block 15″ cube, from "Gibbs" opening in the "Imboden" bed, 8 ft. thick, on Preacher fork of Callaghan creek, on lands (72,000 acres) of the Virginia Coal and Iron Co.

This "Imboden" bed has been opened on these lands at 17 places in a N. E. S.-W. line 18 miles long. (407).

2. Coke made from above coal. (403).

3. Splint coal from Shelving-rock bed, 4′ 6″ thick, with sandstone roof and floor, from S. E. face of Black mountain, from property of Va. C. & I. Co. (404).

4. Splint coal, long block, from same bed as No. 3, from Nine-mile ridge, a spur of Black mn., on Churchhouse branch, 3 miles N. E. of No. 3, from property of Va. I. & C. Co. (402).

5. Cannel coal from upper bench, 26″ thick, of 7′ bed, in Black mn., near head of Preacher fork, from lands of Va. I. & C. Co. (406).

6. Coal from "Imboden" bed where 10′ thick, on Roaring fork of Powell river, in Nine-mile ridge of Black mn., on land of J. P. Imboden. (405).

7. Red shale iron ore from No. V, Clinton, from "Horton" tract of Va. I. & C. Co., on N. W. face of Wallen ridge one mile from Big Stone gap. (410).

8. Iron ore, brown, from "Wildcat" mine on "Collier" tract of Va. I. & C. Co., in valley at head of Wildcat creek. (408).

9. Iron ore, fossil of No. V, Clinton, from 1,050 acres tract of Col. Frank Preston in S. W. end of Wallen ridge near S. fork of Powell river. (409).

Roanoke.

16 Iron ores, limestone and pig irons, from Crozer furnace, Roanoke city, from Mr. Samuel Crozer, president, and Col. D. F. Houston superintendent. Viz: 1. Limestone from Buchanan, Botetourt county, on line of S. V. RR.— 2. Limestone from near Blue Ridge station, Botetourt county, N. & W. RR.—3. Limonite iron ore from Houston mines near Houston station, S. V. RR., Botetourt county.—4. Limonite iron ore from Upland mines near Blue Ridge station, N. & W. RR., Botetourt county. (84).

The following Roanoke minerals are from Capt. F. J. Chapman, of Salem, Va., in continuation of his contributions. Viz:

17. Limestone, No. II, from Catawba valley, same tract as 44 of former list. 45. (245).

18. Limestone, No. II, from near Salem. 46. (246).

19. White sandstone, Oneida, from Catawba mn. 5 ms. W. from Salem. 47. (247).

20. Purple sandstone, Medina, from Catawba mn. 5 ms. W. from Salem. 48. (248).

21. Water of Roanoke Red Sulphur Springs, 6 bottles, with analysis. 49. (249).

22. Chalybeate water from Roanoke Red Sulphur Springs. 50. (250).

Botetourt.

The following are from Capt. F. J. Chapman, of Salem, Va., in continuance of his contributions:

21. Cellular brown hematite iron ore from No. III, Hudson River (?) shales, from the thick, regularly stratified beds of Old Catawba furnace mines. 51. (251).

22. Massive brown hematite iron ore from same mines as above. 52. (252).

The following Botetourt minerals form part of the Crozer furnace exhibit. See under Roanoke, viz:

23. Light gray limestone, No. II, from quarry on S. V. RR. below Buchanan; used for flux at Crozer furnace. 1. (253).

24. Blue limestone, No. II, from near Blue Ridge Springs, N. & W. RR.; used for flux at Crozer furnace. 2. (254).

25. Limonite, brown iron ore, from Houston mines near Houston station, S. V. RR. 3. (255).

26. Limonite, brown iron ore, from Upland mine of Crozer Steel & Iron Co. near Blue Ridge Springs, N. & W. RR. 4. (256).

Amelia.

The following specimens have been loaned by Prof. Wm. M. Fontaine from his collection at the University of Virginia:

1. Potstone, which is found in large quantities. This has been used for stove-backs in place of fire-brick, as it is a good material to resist the action of heat. The outcrop of this stone was cut by the Indians into pots. (195).

2. Fragments of an old Indian pot cut from the above potstone. (196).

3. Zircon, Feldspar, and Columbite, from the Mica mines near Amelia C. H. (197).

4. Amazon stone, which occurs occasionally in the feldspar of the Mica mines near Amelia C. H. (198).

5. Albite feldspar, which occurs in abundance in the Mica mines near Amelia C. H. (199).

6. Crystals of Albite, Feldspar, Quartz, and Mica, from cavities in the Mica mines near Amelia C. H. (200).

7. Orthoclase Feldspar. Occurs in large quantities in the Mica mines near Amelia C. H. It has been shiped for the manufacture of porcelain. (201).

8. Albite Feldspar showing change of colors. This is found occasionally in the Mica mines near Amelia C. H. (202).

9. Beryl crystal,fragment of a large one. The large crystals occur not uncommonly in the quartz of the Mica mines near Amelia C. H. (203).

10. Mica from mines near Amelia C. H. (204).

11. Monazite, from Mica mines near Amelia C. H. where it occurs occasionally. (205).

12. Albite Feldspar, with Spessartite Garnet, from Mica mines near Amelia C. H. where it occurs occasionally. (206).

Nelson.

Col. Thomas Dunlap, of Stapleton Mills, Amherst county, has contributed the following iron ores from the mines of the Central Virginia Iron Co., of which he is lessee.

6. Greenway specular steel ore, from near Greenway station, R. & A. RR. Analysis by Dr. Hy. Froehling, of Richmond, chemist to R. & A. RR.: Iron 65.14, phosphorus 0.029, silica 5.04. (55).

Amherst.

The following were contributed by Col. Dunlap. See under Nelson.

1. Magnetic and specular iron ore, from Maud vein near Stapleton station. R. & A. RR. Analysis, by Dr. Froehling: Iron 63.01, phosphorus 0.104, silica 5.91. (60).

4. Iron ore, "Wingfield," from near Riverville station, R. & A. RR. Analysis by Dr. Froehling: Iron 57.69, phosphorus 0.294, silica 11.41. (207).

5. Steel iron ore from vein No. 6 near Riverville station, R. & A. RR. Analysis by Dr. Froehling: Iron 65.91, phosphorus 0.049, silica 2.96. (208).

6. Steel iron ore from vein No. 6½ near Riverville station, R. & A. RR. Analysis by Dr. Froehling: Iron 67.04, phosphorus 0.018, silica 2.64. (209).

7. Copper ores—Carbonates, Malachite, Bornite, Azurite, Red oxide, and Copper glance—yielding from 27 to 49 per cent metalic copper, from Piedmont Copper mines in Glades; from Col. Thomas Dunlap, Stapleton Mills, Amherst county, Va. (210).

The Arminius Copper mines.—Elsewhere, under the head of contributions for the Va. mineral exhibit at New Orleans from Louisa county, Va, we give a long list of samples of pyrites, etc., that have already been sent in from the properties of the "Arminius Copper Mines Co.," near Tolersville station of Ches. & Ohio Ry.

We published, in May last, a full account of these mines, with map and sections. We now learn from Mine manager W. H. Adams, who made this fine contribution to the display of Virginia's mineral wealth, that these companies expect to erect at their mines a Sulphuric acid plant to utilize 50 tons of pyrites daily. The acid will be sold in Richmond, Baltimore, Norfolk, and other places where it is in demand; any surplus will be put into acid phosphate at the mines to be sold to supply the home demand.

Mr. Adams thinks it is only a question of time when these companies will be able to control the markets named, as well as others, since brimstone can be produced from these Virginia ores at $5 per ton, leaving the gold, silver, and copper as a profit, adding that "at such rates we surely cannot long remain idle."

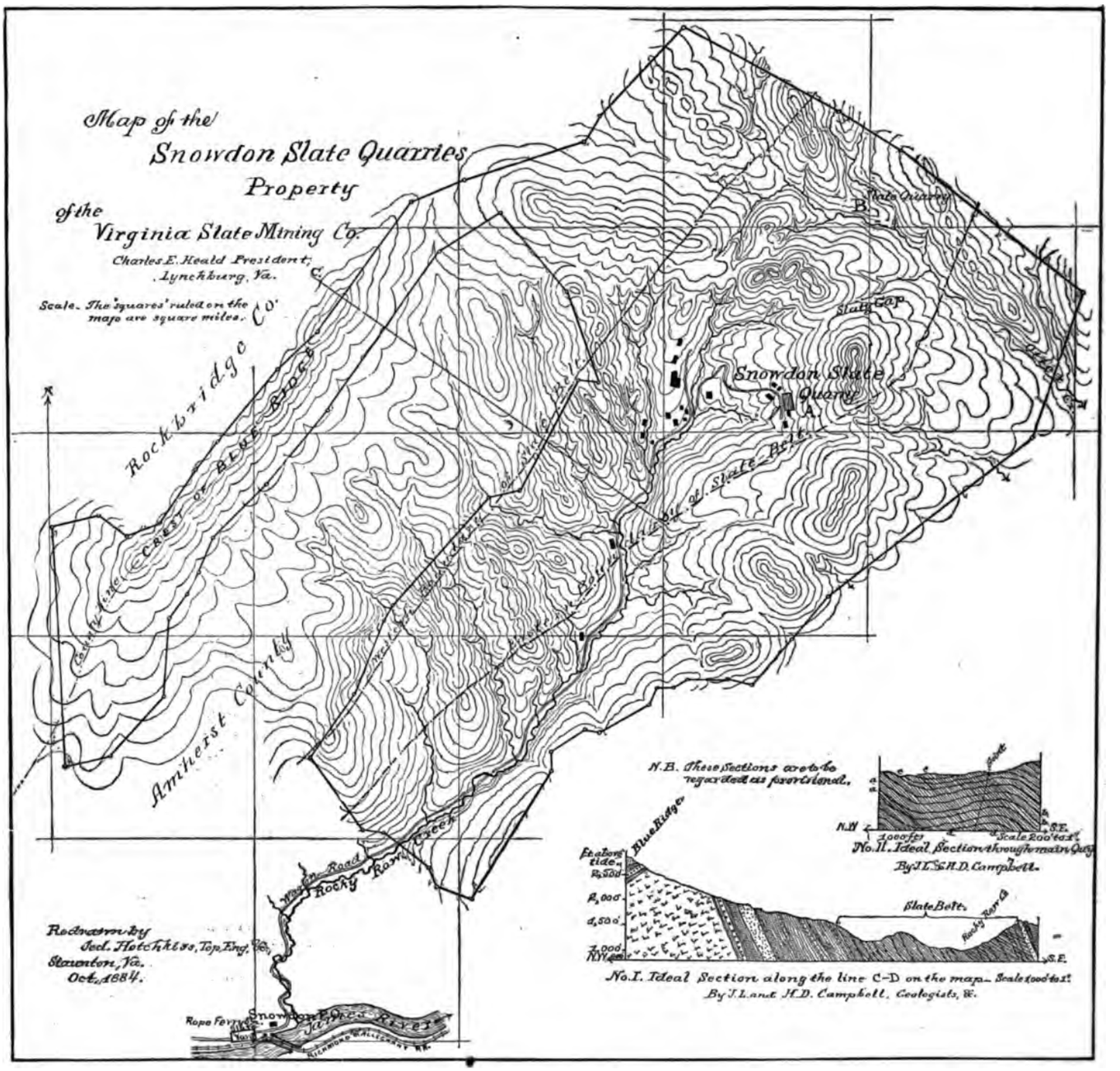
The shipments of pyrites ores from these mines over the Ches. & Ohio Ry., are now about 30 tons a day. By the 1st of next Jan. they expect to mine 100 tons daily. The stock "in sight," at this time, above the 350-feet level, will last for 10 years at this rate of output. Below the 350-feet level it is estimated that the copper will pay three times the cost of mining. Mr. Adams is now in New York city working to get the "Spence" furnaces started to utilize these ores.

It is very gratifying to be able to thus record the working and local utilization of another of our hitherto undeveloped and unused mineral resources, and to welcome to our state such men as Mr. Adams, with the sincere desire that they may reap abundant profits for their investment and enterprise.—Now who will find phosphate beds in our Tidewater region to supplement this manufacture of acid. We think we have such there.

A store-house of mineral wealth.—The stiring up that all portions of Virginia is now having, in the active effort that is being made to have a creditable exhibit of her mineral wealth at the New Orleans exposition,is having much the same effect as the shaking of the fabled "golden sheaf" of the old times had, in that it is bringing to light minerals and metals not heretofore known in the state. A correspondent that has already contributed to the Virginia collection magnetic, specular and other iron ores, tin ore, copper glance, variegated copper, green and blue carbonates of copper, etc., etc., writes us that he has analyses of ores from the Blue Ridge containing Platinum and Iridium and has samples of the Cinnabar ores of Mercury from a fine deposit in the same range.—The county lists that we publish elsewhere give some idea of what this state can furnish in illustration of its mineral wealth, but not a tithe of what could be shown if the means to secure what is known were in hand.

The Virginia State Normal School.—This new institution—one destined to do a vast amount of good in promoting salutary methods of teaching in the public schools of Virginia—having passed successfully through a series of difficulties, will be opened, in Farmville, on the Norfolk & Western Railroad, the 30th of this month, October, with a corps of five instructors, under the superintendency of Hon. Wm. H. Ruffner, LL. D., one of the ablest advocates of well conducted free schools in the Union, and with an annuity of $10,000 from Virginia and $2,000 from the Peabody Education fund

The prospects of this school are good for the session of 1884-5, but its proportions will no doubt become larger, year by year, as its merits are disclosed and the public becomes acquainted with the better class of trained teachers it will send out. The authorities, we are reliably informed, are determined to make it a professional school in the technical sense, based, however, upon a liberal course of academical studies. This full course is one of four years, but it is subdivided into an *elementary* and an *advanced* course of two years each.



The Snowdon Slate Quarries, the location and land of which are shown on the above map, and which are the subject of a report by Professors J. L. and H. D. Campbell, printed on page 162 of this issue, are, undoubtedly, a most valuable property, as the careful and every-way trustworthy report above mentioned clearly shows, and as the testimony of those that have used the slates clearly and satisfactorily proves. We have seen these slates, as piled for shipment at Ropeferry station, and can testify that they are of excelent quality; more than this, we have had samples of them for a studied inspection which was equally satisfactory.

We learn from the president of the Virginia Slate Mining Co., Mr. Charles E. Heald, of Lynchburg, Va., the owner of these quarries, that they are for sale, for the reason that none of the present owners have the time to give them the attention that the business of quarrying and marketing these excelent slates requires. We hope some practical slate man will secure this valuable property and reap the rewards that will surely come from its full development.

A case of the various kinds and forms of slate quarried and shaped at Snowdon has been sent in for the Virginia collection of minerals at New Orleans; it is a highly creditable exhibit.

The Virginias.

Serial No. 59. Vol. V.—No. 11.

Staunton, Va., November, 1884.

Jed. Hotchkiss, Editor.

A Virginia Historical collection for exhibition at the New Orleans Exposition is now being collected by Capt. C. R. Boyd, of Wytheville, State commissioner for this Historical department, and Mr. N. V. Randolph, of Richmond, assistant commissioner. A Virginia historical commission has also been organized, consisting of Gen. Jas. McDonald, president; Rev. Dr. J. Wm. Jones, for general history of Virginia; Edward V. Valentine, for art in Virginia; and R. A. Brock, secretary. All these gentlemen are now hard at work securing the articles needed for this attractive and interesting exhibit, one that all Virginians should feel a deep interest in. The secretary, Mr. R. A. Brock, of Richmond, has issued the following circular, to which there should be a prompt and liberal response:

Virginia being rich in objects of the highest historical interest, it is the design of this commission to obtain such of these interesting relics, from all parts of the state, as to enable it to graphically illustrate the different departments of Virginia's history in the state's display at New Orleans.

The commission would therefore earnestly call upon you, and through you, your friends in the state and elsewhere, for portraits of eminent persons, pictures or paintings of Universities, Colleges, Schools, Charitable institutions, Landscapes, of historical places, &c., Manuscripts, Relics, Costumes, or any other object of interest, to be forwarded without delay to the office of the Virginia Agricultural Department, Richmond, care of Col. Randoph Harrison.

All persons who may feel an interest in this valuable display, are hereby assured that all paintings, pictures, or other objects will be carefully shiped and returned; and during their display will be carefully preserved from all mutilation by a guard specially appointed for the purpose

It may not be improper to suggest that great expedition is necessary, as our time is quite limited.

Natural gas.—We see by the Morgantown, W. Va., papers that arrangements have been made for boring a well for natural gas at that place Prof I. C. White, who has become the expert of experts in locating successfully such wells, having indicated where such a well may be bored with every prospect of success, and that the gas will be reached at a depth of about 1,500 feet.

We are much gratified to learn that there are so many calls for Prof. White's services in locating points for boring gas wells, and hope he may reap many substantial rewards for his sagacity, born of scientific observation and research, and uniform success in locating wells, but with a protest against his being "absorbed" by the "drillers" so he cannot continue the geological investigations which he has been conducting with such eminent ability.

Errata.—On page 164, under Giles county, the fossil named is from Clinton, No. V, *not* from No. I as printed.

On page 176, last column, the annual capacity of Columbia-Liberty furnaces is stated as 32,000 net tons, just as in Swank's directory. We learn, by correspondence with the manager, that the combined capacity of these furnaces is 4,000 tons per annum.

Virginia coke-using blast furnaces, those that may properly be called large *modern live* ones, are all now in blast, or will be when this number of *The Virginias* reaches its readers.

The two at *Longdale*, of the Longdale Iron Co., are so steady-going "in blast" that it is looked upon as matter of course that they should be in blast, as they are; *Victoria*, of the Iron & Steel Works Association of Virginia, having been thoroughly repaired has now been in blast for several weeks, improving on her former record of output. *Low Moor*, of the Low Moor Iron Co. of Virginia, after being idle for three months, for complete refiting, went into blast again Nov. 17th, and is working finely; these three are on the line of the Chesapeake & Ohio Ry.; they make about 300 tons of iron a day.

Gem, of the Shenandoah Iron Co., has recently been put in good order and is working satisfactorily; *Crozer* has only recently gone into blast after a thorough repairing, which added to its efficiency; these are on the line of the Shenandoah Valley RR; they produce about 175 tons daily.

Princess, the new furnace of Capt. D. S. Cook, on the Richmond & Alleghany RR., is just ready to be lighted up as we write this. If good looks, good surroundings, and good prospects, entitle a furnace to be called a "princess" then this one is rightly named; it will probably make about 30 tons a day. *Callie*, near the Princess, is the only one of the Virginia coke-using furnaces recently in blast that is now out.

Pocahontas Va., Coal mine output for Oct., 1884.—V. Pres. H. Wickham of S. W. Va. Improvement Co. sends *The Virginias* the following statement of the coal and coke operations of that company at its mines and ovens at Pocahontas, Tazewell county, Va., during the month of October, 1884, in 2,000 lbs. tons. To this we add, from page 160, the previous output of the year and so give, in the 2nd column, the total output of coal and coke from January 1 to Nov. 1, 1884.

	Oct.	Jan.—Oct.
Coal mined	35,895	217,949
Coal shiped	24,669	140,038
Coal coked	10,417	79,148
Coke shiped	7,908	. . .

The October output was 35 per cent more than the September.—The above represents the output of eight months, and the indications now are that the Flat-top region will furnish this year about 400,000 tons of coal, as shipments have begun from some of the mines recently opened on the Bluestone extension of the N. & W. RR.

The Great Flat-top coal-field is coming to the front in the large output and shipments of the S. W. Va Improvement Co. from Pocahontas, as our returns, above given, show, and in the begining of shipments from the collieries that have recently been opened on the Bluestone extension of the Norfolk & Western RR. Wm.Beury & Cooper began the shipment of coal from the Mill Creek coal mine the first of this month, and by its close they will ship 150 tons a day. Goodwell & Freeman are ready to ship from their Caswell Fork coal mine as soon as the railway reaches it, which will be about Dec. 1st. It is now probable that three more leases will soon be made by the Flat-top Co. All the indications and prospects are good for a speedy development of this wonderful coal field.

The principal office of the Flat-top Coal Co. is at 35 S. 3rd st., Philadelphia; C. H. Duhring is its president, J. Milton Colton its treasurer, and J. H. Bramwell, C. & M. E., superintendent., it also has officers at Roanoke and Pocahontas, Va.

Notes on the Geology of West Virginia.

By Prof. I. C. White.

The annual geological excursion from the West Virginia University during May, 1874, was taken by all the members of the graduating class, viz: W. T W. Barb, R. C. Berkeley, Jr., W. H. Michael, H. L. Robinson, and J. D. Sweeney, of the class of 1885.

The route selected was as follows: From Morgantown across Chestnut ridge and down to the B. & O. RR. at Independence; thence along the B. & O. RR., stoping at many points and walking between stations, so as to pass in review the entire column of rocks from the Pittsburg coal down to the Archaean in the Blue Ridge at Harper's Ferry. Returning to Piedmont we took the W. Va. Central & Pittsburg RR. for the wilderness region of the Upper Potomac coal field in the vicinity of Fairfax stone, the then terminus of that RR. From this point we recrossed the Alleghanies on foot, reaching the RR. at Buckhannon, Upshur county, 75 miles from Fairfax. From Buckhannon we passed along the narrow gauge railroad to Clarksburg; thence along Baltimore & Ohio Railroad to Parkersburg, thence up the Little Kanawha river to Burning Springs, and returned by boat; thence up the Ohio river to Wheeling; and from there by the B. & O. back home.

The class and myself are under obligations for favors, to Mr. L. M. Cole, Gen. Ticket Agent B. & O. RR., Hon. H. G. Davis, Col. T. B. Davis, and Capt. Harrison, officers of the W. Va. C. & P. RR.; also to the Superintendent of the Elk Garden mines; to Mr. Porter and engineers of the W. Va. C. & P. constructing force, and to Mr. Riordan, ex-state mine inspector of Maryland; to the officers of the Buckhannon, Weston and Clarksburg RR., and to Capt. S. P. Wells & Bro.; of the steamer Oneida, Parkersburg.

These annual excursions are taken with a view of giving the student a general survey of all the rock formations accessible in our state; hence but little time can be given to detailed examinations except in limited areas of especial interest, and although many notes were taken which may fit into future papers, yet only two or three regions were examined with that care which is necessary to warrant the publication of results.

One of the regions where detailed examinations were made, is that in the vicinity of Elk Garden, on the W. Va C. & P. RR. Here, about 12 miles southwest from Piedmont, nearly 400 acres of the Pittsburg coal are caught in the same great trough that holds so much of that bed along George's creek between Piedmont and Frostburg. This area of the "Big vein" coal as it is locally termed, has been known for a long time, but being entirely inaccessible to transportation facilities, has remained undeveloped until through the enterprise of Hon. Henry G. Davis the W. Va. C. & P. RR. was recently built out to it from Piedmont.

The Pittsburg coal area of Elk Garden occupies the summit of the mountain at an elevation of 2,350′ A. T., while the North Potomac river cuts an almost vertical chasm 800′ to 1000′ deep alongside its western boundary, thus exhibiting a fine exposure of the Barrens (No. XIV), the Lower Coal measures (No. XIII), and the upper portion of the Great Conglomerate, (No. XII).

The following section was obtained in descending from the summit of the mountain above the Elk Garden mines to the North Potomac river directly below the Elk Garden cottage:

1. Concealed, but containing a massive sandstone (Sewickley)		50′	
2. *Coal, Sewickley*		7′	
3. Concealed		110′	
4. Coal, Pittsburg — Roof coal: coal 1′ 6″; shale, gray 1′ 6″	3′		
4. Coal, Pittsburg — Main bench: bone coal 0′ 7″; top coal, 2′ 6″; breast coal, 5′ 0″; mining coal, 0′ 6″; mining ply. 1′ 6″; slate, d'k gray, 0′ 3″; bottom coal, 2′ 6″	12′ 10″	15′	10″
5. Concealed		170′	
6. Coal, Elk Lick: coal 1′ 4″; slate 2′ 0″; coal, slate 1′ 4″		4′	8″
7. Concealed and massive sandstone (*Mahoning*)		225′	
8. *Coal, Upper Freeport*: coal 1′ 3″; shales 4′ 0″; coal 3′ 0″		8′	3″
9. Shales, sandstone and concealed		55′	
10. *Coal, Lower Freeport?*		2′	
11. Concealed and massive sandstone (Freeport)		155′	
12. *Coal, Lower Kittanning*: Coal 0′ 8″; bone coal 0′ 3″; coal 0′ 10″; dark sandy F. C. 6′ 24″; coal, good 2′ 10″		5′	10″
13. Concealed to base of No. XIII		120′	
14. Massive sandstone (Homewood) top of XII		50′	
15. *Coal*, slaty		1′	5″
16. Shaly sandstone		40′	
17. Massive sandstone		10′	
18. Concealed to level of North Potomac river		10′	

Resumé of section.

Upper coal measures, XV	173′
Barrens, XIV	400′
Lower coal measures, XIII	346′
Pottsville conglomerate, XII, exposed	114′
Total height of section	1,033′

The *Sewickley coal*, No. 2, has been opened on the Elk Garden tract, and found to have a thickness of 7 feet, but there is hardly sufficient roof over it to warrant mining, since the coal, although quite pure, would probably be too soft to bear shipment. The surface above this coal bed seems to have been preserved from erosion by a massive sandstone, small blocks of which are seen scattered over the surface.

The Pittsburg coal, No. 4, has here practically the same structure as at Piedmont and elsewhere in the George's creek basin, the only difference being that while the main bench is there seldom more than 10′ thick, it is here 14 feet, nearly all of which is merchantable coal. The output is approximately 1,000 tons daily, and it goes to the seaboard cities mostly as a steam coal, for which purpose it can hardly be exceled.

No. 6 is the bed of coal that has been opened in the hill below the cottage, but it contains slate and other impurities in such quantity as to render it worthless; it possibly represents the *Elk Lick coal* of the Pennsylvania series.

The surface of interval No. 7 is covered with large blocks of massive sandstone that have come from the *Mahoning series* which is included therein.

The Barrens, XIV, foot up only 400′ in thickness at Elk Garden, instead of 600′ which I obtained at Piedmont in 1880. This latter measurement was partly compiled, and hence is possibly too great, since it is hardly probable that the *Barrens* have decreased 200′ in thickness in the 12 miles between Piedmont and Elk Garden.

The 400′ measurement in the above section cannot be more than 25′ to 30′ in errror, since the hills there are practically vertical, and to compensate for the slight eastward dip I have added 30′ to the interval as given by the barometer.

The Upper Freeport coal, No. 8, is known here as the "*Split vein*" from the fact that it is almost universally separated into two portions by an intervening layer of shale. This bed has been exploited in the hill below Elk Garden cottage, and also on the other side of the property near the incline, but at neither locality is it thick enough to mine profitably at present, though the lower bench is a rather good coal and ought to coke fairly, judging from its physical characteristics.

No. 10 of the section is reported as very clean coal,and its stratigraphical position seems to parallelize it with the *Lower Freeport coal* of Pennsylvania.

The Lower Kittanning coal is represented by No. 12 of the section. It has been opened in the hill above the main line of the W. Va. C. & P. RR., and used for coaling the engines. Unfortunately for this coal, it is split by a very sandy layer which renders its mining both difficult and expensive, and there seems but little prospect that this objectionable feature will disappear, since where the same bed was opened near the foot of the Elk Garden incline, this sandy stratum was even thicker than that given above. This is the "*Six-foot*" *bed* of Piedmont and George's creek, or the same as that mined by Mr. Spangler in Westernport hill.

The *Lower Coal Measures* (No. XIII) foot up 346′ in thickness here instead of 268′ at Piedmont, and it is possible that the concealed interval of the *Barrens* may be in part accounted for by this 80′ increase of the No. XIII beds.

The North Potomac river flows from Elk Garden to Piedmont at about the same geological horizon in the top members of No. XII, and hence the inter-conglomerate coal, No. 15, is frequently visible in the cuts along the W.Va. C. & P. RR., and from this fact it has come to be known locally as the "Railroad coal." It varies much in thickness, sometimes almost disappearing, and again thickening up to 5′ or 6′, as it does just above Blaine station. The coal is slaty and otherwise impure, however, and hence it will probably never furnish any merchantable fuel even where it is thick enough to mine. The bed in question is the same one that occurs near the end of the Davis bridge at Piedmont, 60′ to 75′ above the river, where it is 2 feet thick. It is one of the *Mercer series* of Western Pennsylvania.

Note on the Lower Kittanning Coal in the Newburg Shaft.—In a paper for *The Virginias*, during 1882, I gave the record of a diamond drill hole that had been sunk at Newburg, Preston county, W. Va., to test the thickness of the *Lower Kittanning coal.* As the coal was found of merchantable thickness and quality, a shaft was sunk to it which has now been completed, and from the superintendent I learned the following particulars which are of sufficient interest for publication. The shaft was sunk a few rods distant from the bore-hole and begins at a higher level, hence its record is slightly different from that of the latter. The mouth of the shaft is 480′ under the *Pittsburg coal* which comes in the tops of the hills here, and as the *Upper Freeport coal* was struck at 165′, the *Barrens* (XIV) have a thickness of (480′ + 165′) to 645′, against 636′ as given by the bore-hole record in the paper above refered to. The depth of the shaft to the bottom of the *Lower Kittanning coal* is 359′, and as the *Upper Freeport* bed was 5′ thick the interval from the latter coal to the bottom of the *Lower Kittanning* is 359′–170′=189,′ or say 180′ between the two beds.

The bottom portion of the shaft exhibits the following details according to the measurements of the superintendent:

1. Sandstone			
2. Coal, *Upper Kittanning*	Coal	1′ 0″	7′ 3″
	slate	0′ 3″	
	coal, slaty	2′ 0″	
	fireclay	2′ 0″	
	coal, good	2′ 0″	
3. F. C. & Shales with iron nodules			15′
4. Coal, *Lower Kittanning*	Coal	0′ 10″	9′ 5″
	shale, gray	0′ 10″	
	coal	0′ 6″	
	bony coal	0′ 3″	
	coal	4′ 6″	
	black plate	3″-9″	
	coal	1½′-2½′	

No coal had been shiped from No. 6 at the time of our visit in May, since a greater amount of water was encountered than the pumps could bring up, but arrangements were then being made to put in pumps of larger capacity, and when this is done there is no reason why coal may not be profitably shiped from the *Lower Kittanning* bed, since so far as appearances indicate, it would seem to be an excelent gas coal.

The production capacity of Virginia's blast furnaces.—On page 176 we publish, from Swank's Directory, a full description of most of the iron making furnaces of Virginia; below we summarize, from that list, the annual capacity of these furnaces for the production of pig iron, in 2,000 lbs. tons.

Coke using furnaces.

Names of furnaces.	Capacity, tons.
Buffalo Gap (2)	9,000
Callie, (Estimated)	4,000
Crozer	35,000
Gem	30,000
Longdale (2)	29,000
Low Moor	40,000
Lynchburg	14,000
Powhatan	9,000
Princess	10,000
Victoria	50,000
Total annual capacity	230,000

2. Charcoal using furnaces.

Amherst	2,500
Barren Springs	2,000
Cave Hill (Estimated)	2,500
Cedar Run (Estimated)	2,500
Columbia-Liberty (2)	4,000
Beverly, Eagle, Raven-cliff, Speedwell (4)	7,500
Glenwood	2,000
Grace	1,600
Irondale (Estimated)	3,000
Ivanhoe	8,000
Brown Hill-Walton (2)	8,500
Locust Grove	3,500
Number-two-Catharine (2)	3,000
Mine Run (Estimated)	2,000
Mount Vernon (Estimated)	2,000
Pierce	2,000
Radford (Estimated)	4,000
Reed Island	2,000
Salisbury	4,000
Sinking Creek (Estimated)	1,500
Van Buren	2,500
Virginia	1,500
Wythe	1,500
Total annual capacity	73,600

The Blast Furnaces of West Virginia.

The following list of the Blast furnaces of W. Va., as of Sept. 1, 1884, is from the recently issued Directory of the Iron and Steel Works of the U. S. by James M. Swank, secretary of the Am. Iron and Steel Association.

1. Coke using Blast furnaces.

1. Belmont Furnace, Belmont Nail Co., Wheeling, Ohio county. One stack, 60x16, first blown in Sept. 4, 1875; closed top; two iron-pipe hot-blast stoves; fuel, Connellsville coke; ores, Lake Superior; specialty, No. 1. mill pig iron, strictly red-short; annual capacity, 18,000 net tons. Brand, "Belmont."

2. Bettie Furnace, Black Band Iron and Coal Co., Charleston, Kanawha county. Furnace located at the mouth of Davis creek, on the Great Kanawha river, 4 miles below Charleston. One stack 50x10½, commenced in 1882, and completed and put in blast in 1883; fuel, coke; ores, local black-band, block, and limonite; daily capacity, 30 net tons. John Wooldedge, president; F. A. Dearborn, secretary; Wm. S. Denny, treasurer; C. K. McDermott, manager; J. H. Huling, superintendent.

3. Irondale Furnace. F. Nemegyei, Raccoon, Preston county. New York office, 99 Water st. One stack, 62x13, built in 1861, and rebuilt in 1878–9; fuel, coke, manufactured from coal mined on the property; ore, a mixture of half and half limonite and hematite, also obtained on the property; product, slightly cold-short pig iron; annual capacity, 10,000 net tons. Brand, "F. N." Alexander Strausz, general manager.

4. Quinnimont Furnace, Quinnimont Coal and Iron Co., Quinnimont, Fayette county. Office, 407 Walnut st., Philadelphia. One stack, 60x16, built in 1874; closed top; fuel, coke; ore, Virginia brown hematite; product, principally foundry pig iron; annual capacity, 12,000 net tons. F. A. Comly, president, C. Gilpin, Jr., secretary and treasurer, Philadelphia; S. B. Patterson, manager at the furnace.

5. Riverside Furnace, Riverside Iron Works, Wheeling. Furnace at Benwood, Marshall county. One stack, 75x17, built in 1872, and remodeled in 1876; closed top; fuel, Connellsville coke; ores, best grades of Lake Superior and Missouri; product, Bessemer pig iron; annual capacity, 40,000 net tons. Brand, "Riverside."

6. Top Mill Furnace, Wheeling Iron and Nail Company, Wheeling. One stack, 65x17, built in 1873–4; first blown in October 3, 1878; at present lined to 16½ feet across bosh; closed top; four iron hot-blast stoves; fuel, Connellsville coke; ore, Lake Superior; product, gray forge pig iron; annual capacity, 30,000 net tons.

7. Waldorf Furnace, Keyser Bros. & Co., Baltimore. Furnace at Irontown, Taylor county. One stack, 50x12, built in 1873; fuel, coke; ore, local limestone; closed top; annual capacity, 6,000 net tons.

2. Charcoal using Blast furnaces.

1. Bloomery Furnace, Bloomery Furnace Co., Bloomery P. O., Hampshire county. One stack, 40x9, built in 1844, rebuilt in 1880; closed top; cold blast; product, car-wheel and mill pig iron; weekly capacity 60 net tons. Property for sale. John Birkinbine, 144 South Fourth st., Phila.

2. Capon Iron Works, Keller & Co., Capon Iron Works, Hardy county. One stack, 32x8, built in 1822 by James Sterrett, and run by him for some time, then sold to Geo. F. Hupp, and in 1856 bought by J. J. Keller, who has since run the works; open top; cold blast; ore, local hematite; product, car-wheel iron; annual capacity, 1,500 net tons.

3. Elk River Furnace, Elk River Iron Co., Strange Creek, Braxton county. One stack, 42x11 5-6, built in 1874-6; cold blast; ores, mixture of limestone, spathic, and hematite, all mined on the property; product, car-wheel pig iron; annual capacity 5,000 net tons. B. J. Jordan, president; A. R. Lake, treasurer; M. T. Frame, secretary.

4. Gladeville Furnace, Eugene List, Wheeling. Furnace at Gladeville, Preston county. One stack, 36x7½, built in 1872; warm blast; ore mined on the property; daily capacity, 9 net tons.

5. Kanawha Iron Co., Coal Valley, Fayette county. One stack, 48x13, begun in 1875, but not yet completed; closed top: Whitwell hot-blast; daily capacity to be 40 net tons. N. I. Bigley, president; G. L. Drouillard, secretary.

6. Virginia Furnace, "Falls of Muddy Creek," Preston county. One stack, 30x6, built in 1855, and first blown in in 1856; water-power; cold blast; brown hematite ore; product, foundry and forge pig iron; daily capacity, 6 net tons.

The brick-paved streets of the city of Charleston, W. Va., are the delight of all admirers of good roadways, and it is safe to say that when all the streets of that most eligibly located capital city are graded and paved, as are long stretches of its Capitol, Summers, Kanawha, and other streets, it will be one of the most agreeable of places for locomotion of all ordinary sorts in the country.

A few years ago this town was a terror for a good portion the year to any one that had to move about it. Located on a wide alluvion of deep fat soil, the product of the disintegration of the fatness of the rocks of sixteen geological formations, from the basal Archaean upward, whenever the rains came, in common phrase "the bottom droped out" of the streets and they became almost impassible. About a dozen years ago Dr. J. P. Hale, the embodiment of progress and improvement, who undertook and carried through the job of converting a dingy village into an inviting capital city, seeking for some plan to secure permanent roadways where there was nothing permanent to construct them on, conceived the idea of first shaping the road bed into turnpike fashion, with a convex surface, then puting on this a layer of sand about 3 inches thick, laying over this a sheeting of inch boards soaked in gas-tar, spreading on this 2 inches of sand, on which is put a pavement of hard-burned brick, laid on edge, "herring-bone" fashion, the whole finished with a layer of sand to fill up the spaces between the bricks.

The first roadway of this kind was put down in Charleston in 1873, on a street where the heaviest traffic of the city passes; that roadway we examined a few days ago and found it in excelent order—in fact as good a street as any one could desire.

What has proven so satisfactory in Charleston—so much so that all the residents on the streets not yet treated with the roadway of the American Brick Paving Co. are clamoring for it—is now being introduced into Wheeling W. Va. It seems to us, from a careful observation of the condition and wearing of this pavement from the time of its introduction into Charleston to the present, that it is not only the best but the cheapest plan yet devised for improving the streets of towns where good bricks can be procured at reasonable figures; in Charleston it costs about $1.25 a yard. Not the least of its advantages is the cleanliness of the streets so paved; it requires but little care and trouble to keep the whole street, from buildings to buildings, in the condition of a good ordinary pavement; then it is well nigh a noiseless pavement, one that it is a pleasure to drive over for both man and beast, and it is free from the objectionable clouds of dust that gather and are blown from macadamized streets and from the disagreeable noise and horse-damaging hardness of granite pavements. We would like to see the streets of many of our Virginia towns thus paved, and would advise those having street improving in view to consult with Dr. J. P. Hale, Charleston, W. Va., the president of the company owning the right to put down this brick roadway.

The Bermuda, Va., Ochre Works are on the north bank of the Appomattox, in Chesterfield county, Va., 5 miles above the terminus of the Brighthope Railroad at Bermuda Hundred, 5 miles from City Point, and 7 by river from Petersburg, in a region noted in the colonial as well as in the recent history of Virginia. The crude ochre is dug from a bed, or "vein" as people will call it, that is from 3½ to 6 feet thick, and that underlies a stratum of iron ore (from which a very good mineral paint can be made) that is from 3 to 12 inches thick.

The crude ochre after it is dug is washed and dried and then ground into an article that in fineness of quality and in adaptation to all the purposes for which a light yellow ochre is used—and it is the basis for most the colored paints now used—is claimed to be equal to the best imported French.

The mills of this company are now runing and there is a fair demand for their product, considering the general depression in all manufacturing industries. These mills have a capacity for producing 3,000 tons per annum. Gridley & Co., 87 Maiden Lane, New York city, are the agents for the sale of this ochre; they are part owners of the property; Mr. B. A. Davis of Petersburg, Va., is the superintendent. Samples of this ochre have been sent in for the New Orleans Exposition.

The "Dinwiddie papers."—Last year the Virginia Historical Society published a handsome volume of the "papers" pertaining to Virginia, left by one of her most noted Colonial governors, Dinwiddie, and now a second volume of these valuable and deeply interesting papers is nearly through the press and will soon be issued to the members of this now flourishing society.

These papers were purchased in England by Corcoran, the Washington philanthropist, for a large sum, and then kindly donated to this society which his munificent bounty has frequently aided by timely and ever-to-be-remembered gifts.

It is proposed to illustrate this 2nd volume with a reproduction of Fry and Jefferson's map of Virginia, which, according to Dr. P. Slaughter, in his memoir of Fry, was finished in 1745, and which was the standard map of the colony during Dinwiddie's administration, which began in 1752 and ended in 1758, embracing one of the most interesting "war periods" of Virginia's history, that in which Washington first came to the front as a commander.

Now is a good time to secure membership in this honorable society by applying to R. A. Brock, Richmond, Va., its learned and tireless secretary, and thus secure this volume of "papers" and the rare map that will accompany them.

Directory to the Iron and Steel Works of the United States.—We are greatly obliged to Mr. Jas. M. Swank, the secretary of the American Iron and Steel Association, 261 S. 4th st., Philadelphia, Pa., for a copy of his "Directory to the Iron and Steel Works of the United States, embracing the Blast furnaces, Rolling mills, Steel works, Forges and Bloomaries in every State and Territory; corrected to September 1, 1884.

This is an indispensible volume to every one that would be informed concerning the character, capacity, ownership, location, etc., of the iron and steel works of the United States. It is full, accurate, and reliable, and that is saying all that one can say for a directory. It can be obtained, by mail, by remiting $3 (12s. 6d. by our English readers) to the above address.

Elsewhere we present some of the Virginia and West Virginia items from this valuable volume.

Spelling.—We intended to say in our September No., under the head of "Errata," that:

In deference to the request of our friend Prof. Campbell we print the report on Snowdon slate quarries, p. 162, in the "ancient" style of spelling, that prevalent in the days of Virginia's ancient and memorable mariner, Captaine John Smith, when it was the custom to indulge in such orthography as: "warres," "ffriday," "Danyell," "victualls," "sett," "nuttes," "shipp," etc, just as our learned friend and the multitude that goes with him ("to do evil" to words) now insist upon spelling "shipp-ing," "shipp-ed," "bedd-ing," etc. We are gratified to report that many of our cotemporaries are "improving in spelling."

Working Virginia Gold ores.—Wm. F. Kirtley, of the Belzora Gold-mine, Goochland county, sent us samples of gold ore from eleven different mines in the Virginia gold belt in the counties of Goochland, Fluvanna and Louisa. In transmiting these he writes: "These samples contain sulphurets of iron and copper which are rich in gold, as evidenced by their yield after being taken from the mine and exposed for a great while to the action of the elements. I have obtained from these sulphurets, by paning and amalgamating, as high as $66 per ton of 2,000 pounds; but in no case have I goten full value, as the material was not thoroughly decomposed.

Under the common mode of working gold ores this material yields, in *free* gold, from $1 to $2 per ton, and in my explorations of this state and a part of North Carolina I find this character of quartz associated with slate of equal value, in deposits seemingly inexhaustible.

With the cheap and unlimited amount of labor and other things actually necessary for mining operations in this country, gold ores yielding from $1 to $2 per ton will pay a handsome margin of profit upon the amount necessary to be expended in legitimate operations. In view of these facts I propose to organize a company for the purpose of controling and working Virginia mines. I believe my plan of operations and knowledge of the gold-fields of the state, if made known to those who feel interested in the development of her material wealth, would be followed by favorable results.

New Treatment of Refractory Gold Ores.—Mr. H. G. Sickel of Philadelphia, Pa., sends us the following interesting item from "The Record," of that city, adding that it is reported that Dr. Cassell, of New York city, has purchased the patent for this process in the U. S., and that this is just the apparatus needed to reduce the gold ores of Goochland, Va., and adjacent counties, and if it can do what is claimed for it, there are millions of dollars, I doubt not, of gold within 100 miles of Richmond that can be saved with small cost and in a very brief period.

London, October 31.—Henry R. Cassell, a New York electrician, has lately been exhibiting a new process of treatment of refractory gold ores, which has created considerable excitement among mining men and scientists. This process was to-night the subject of an interesting lecture by Dr. Atcherley. The ores need no roasting, and the gold is extracted by means of nascent chlorine generated by electrolyzing common salt. The addition of lime is necessary to prevent other metals being dissolved. A six months trial on a large scale has resulted in a wealthy syndicate purchasing the invention for $300,000.

Bridges over the Great Kanawha, says the board of U. S. Engineers, should be 75′ above low water mark at Charleston and 90′ at Point Pleasant; and at any point 29′ above high water mark; also that the spans shall be 400′.

The Blast Furnaces of Virginia.

The following list of the Blast furnaces of Virginia, as of Sept. 1, 1884, is from the recently issued Directory of the Iron and Steel Works of the U. S. by James M. Swank, secretary of the Am. Iron and Steel Association.

1. Coke using Blast furnaces.

1 and 2. Buffalo Gap Furnaces, Virginia Iron & Steel Co., Buffalo Gap, Augusta county. Two stacks 35 x 9 and 40 x 10½, built in 1869 and 1873, respectively; closed tops; two hot ovens; ores brown hematite and fossil, mined on the property; total annual capacity, 9,000 net tons. Brand "Buffalo Gap." H. W. Howell, president: Henry J. Rogers, secretary and treasurer; D. P. McCorkle, manager.

3. Callie furnace, Hileman, Waring & Co., Clifton Forge, Alleghany county. Furnace in Botetourt county. One stack, 48 x 12, built in 1873-4 for charcoal, but since enlarged and changed to coke; open top; two iron hot-blast stoves; ore, hematite, from the furnace property; product mill pig iron. Brand, "Callie." O. Hileman, superintendent. Selling agents, E. L. Harper & Co., Cincinnati.

4. Crozer Furnace, Crozer Steel & Iron Co., Upland, Delaware county, Pa. Furnace at Roanoke, Roanoke Co., Va. One stack, 70 x 16, built in 1882-3, and first put in operation May 29, 1883; three Whitwell hot blast stoves; closed top; fuel, Pocahontas (Va.) coke; ore, local hematite; annual capacity, 35,000 net tons. Brand, "Crozer." Samuel A. Crozer, president; W. H. H. Robinson, treasurer; Francis E. Weston, secretary; D. F. Houston, general manager, at the furnace.

5. Gem Furnace, Shenandoah Iron Co., Milnes, Page Co., Va. One stack, 75 x 16, built in 1882, and first blown in February 8, 1883; three Whitwell hot blast stoves; closed top; fuel, Connellsville coke; ore, brown hematite, mined on the furnace property; product, foundry pig iron; annual capacity, 30,000 net tons. Brand, "Gem." Wm. Milnes, secretary; John Milnes, treasurer; E. C. Crowther, superintendent. Selling agents, Justice Cox, Jr., & Co., 220 South Fourth st., Philadelphia.

6 and 7. Longdale Iron Co., Longdale, Alleghany county. Two stacks; one stack, (Lucy Selina,) 60 x 11, built in 1827, rebuilt in 1873, and raised to 60 feet in 1876; the other stack, 60 x 14, first put in blast in February, 1881; closed tops; steam-power; fuel, West Va. coke; ore, brown hematite, mined near the furnace; product, principally gray forge pig iron; total annual capacity, 29,000 net tons. Brand, "Longdale." F. A. Comley, president, 407 Walnut st., Philadelphia; J. E. Johnson, manager; E. L. Harper & Co., Cincinnati, sole western sales agents.

8. Low Moor Furnace, Low Moor Iron Co. of Va., Low Moor, Alleghany county. One stack, 74 x 18, built in 1880; four Whitwell fire brick hot-blast stoves; fuel, New River coke; ore, local brown hematite; product, foundry pig iron; annual capacity, 40,000 net tons. John Means, president; H. M. Bell, vice-president; John F. Winslow, chairman executive commitee; A. A. Low, treasurer; E. A. Low, assistant treasurer, 31 Burling Slip, New York; H. W. Goodwin, general manager. Western sales agent, Thomas A. Mack, Cincinnati.

9. Lynchburg Furnace, Lynchburg Iron Co., 235 Dock st., Philadelphia. Furnace at Lynchburg, Campbell county. One stack, 60 x 11¾; first put in blast in December, 1880; remodeled in 1882, and again in 1884; bell-and-hopper top; fuel, New River coke; ores, local brown hematite and magnetic; annual capacity 14,000 net tons.

10. Powhatan Furnace, Philadelphia and Reading Coal & Iron Co., 227 South Fourth st., Philadelphia. Furnace in Henrico county, on the Richmond & Alleghany Railroad, 5 miles above Richmond. One stack, 50 x 13½, built for coke in 1860, called Westham Furnace, and rebuilt for anthracite in 1872 3; open top; water-power; annual capacity 9,000 net tons.

11. Princess Furnace, D. S. Cook, Carolina, Botetourt county. Furnace at Wilton station, on Richmond & Alleghany Railroad. One stack, 60 x 12½, built at Ashland, Boyd county, Kentucky and first put in operation in May, 1877; removed to Virginia in 1883-4; three Whitwell fire-brick hot-blast stoves; closed top; fuel, coke; ores, brown hematite, red shale, and manganese, mined on the furnace property; annual capacity, 10,000 net tons. Furnace to be put in operation in November, 1884. T. D. Kauffelt, manager.

12. Victoria Furnace, The Iron & Steel Works Association of Virginia, Limited, Goshen Bridge, Rockbridge county. Main office, London, England. One stack, 85 x 20, built in 1882-3, and put in blast May 1, 1883; three 60 x 25 Siemens-Cowper Cochrane fire-brick hot-blast stoves; three Mackintosh, Hemphill & Co's patent cut-off blowing engines, with air cylinder, 84 in x 48 in., and steam cylinder, 48 in. x 36 in.; closed top; fuel, New River (West Va.) coke; ore, limonite, mined near the furnace; product, neutral foundry and forge pig iron; annual capacity, 50,000 net tons. Brand, "Victoria." George Arbuthnot, chairman, London; A Norris, secretary, 41 Haymarket, London; Wm. N. Page, general manager, at the furnace. Selling agents, E. L. Harper & Co., Cincinnati, Ohio.

2. Charcoal using Blast furnaces.

1. Amherst Furnace, operated by the executors of the estate of S. F. Jordan, Snowdon, Amherst county. One stack, 33 x 9, built in 1863; warm blast; closed top; water-power; ore, brown hematite; product, car-wheel pig iron; annual capacity, 2, 500 net tons. John T. Jordan, manager. Selling agents, R. C. Hoffman & Co, Baltimore, and E. L. Harper & Co, Cincinnati.

2. Barren Springs Furnace, C. B. Squier, 113 Liberty st., New York. Furnace at Reed Island, Wythe county. One stack, 35 x 8, built in 1853, and rebuilt in 1873; cold blast: annual capacity, 2,000 net tons.

3. Cave Hill Furnace, Robert Sayers, McTeer, Wythe county. One stack 47 x 10, built in 1881-2; open top: cold blast; ores, red and brown hematite and magnetic, mined near the furnace; Weimer blower; product, car wheel pig iron; daily capacity 10 net tons. A. P. Calfee, manager.

4. Cedar Run Furnace, Graham & Robinson, Graham's Forge, Wythe county. One stack, 32 x 9, built in 1832, cold blast; water-power; ore mined on the furnace property; specialty, car-wheel pig iron. Selling agents R. C. Hoffman & Co., Baltimore. J. W. Robinson, part owner and general manager.

5 and 6. Columbia-Liberty Iron Co., Columbia Furnace P. O., Shenandoah county. Philadelphia office, 216 South Fourth st. Two stacks in Shenandoah county; Columbia Furnace, at Columbia Furnace P. O., 32 x 10, built in 1809, and rebuilt in 1829. Liberty Furnace, at Liberty Furnace P. O., 30 x 9½, built in 1821. Cold blast, ores, local red and brown hematite; product, car-wheel pig iron; total annual capacity, 32,000 net tons. Brand, "Liberty." Samuel G. Merrick, vice-president, and acting president, Philadelphia; Charles H. Krumbhaar, treasurer, Philadelphia; W. D. Pollard, secretary; Jacob Wissler, superintendent.

7, 8, 9 and 10. Crockett & Co., Crockett Depot, Wythe county. Four stacks in Wythe county; Beverly Furnace,

at Crockett Depot, 33 x 9, built in 1880. Eagle Furnace, at Crockett Depot, 34 x 9, built in 1863; rebuilt in 1881. Raven Cliff Furnace, at Crockett Depot, 29 x 9, built in 1810, and rebuilt in 1876. Speedwell Furnace, at McTeer, 32 x 9, built in 1873-4. All cold blast; total annual capacity, 7,500 net tons; water-power; open tops. J. W. Robinson, Graham's Forge, part owner and general agent. Selling agents, R. C. Hoffman & Co., Baltimore.

11. Glenwood Furnace, F. T. Anderson, Glenwood, Rockbridge county. One stack, 35 x 8½, rebuilt in 1874; open top; warm blast; water-power; ores, brown hematite, specular and magnetic, mined near the furnace; product, car-wheel pig iron; annual capacity, 2,000 net tons. F. T. Anderson, Jr., superintendent.

12. Grace Furnace, Tredegar Co., Richmond. Furnace at Craig's Creek, Botetourt county. One stack; 33 x 9½, built in 1850, burned in 1864, and rebuilt in 1873; cold blast; closed top; capacity, 1,600 net tons. Has been out of blast since 1875.

13. Irondale Furnace, Slaughter, Dunn & Co., Crockett Depot, Wythe county. One stack, 33 x 11, built in 1881, and blown in in March 1882; closed top; cold blast; ores, local red and brown hematite; product, No. 2 foundry pig iron; daily capacity 15 net tons. Brand, "The Norma Iron Co." John F. Slaughter, president, George R. Dunn, secretary and treasurer.

14. Ivanhoe Furnace, New River Mineral Co., Ivanhoe Furnace P. O., Wythe county. One stack, 42 x 12, built in 1881-2, and first put in blast in March, 1882; cold blast; bell-and-hopper top; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 8,000 net tons. Main office, 49 Cliff st., New York. Joshua Hendricks, president; Jordan L. Mott, vice-president; J. T. Pearson, secretary and treasurer; W. C. Van Doren, superintendent and agent at the works.

15, 16 and 17. Lobdell Car-wheel Co., Wilmington, Delaware. Three stacks; Brown Hill Furnace, at Red Bluff, Wythe county, 40 x 8½, built from 1870 to 1874, and rebuilt in 1882. Walton Furnace, at Max Meadows, Wythe county, 33 x 8½, built in 1872. White Rock Furnace, in Smyth county, 5 miles from Rural Retreat station, Wythe county, 38 x 8½, built in 1875 and blown in August 9, 1875. Closed tops; cold blast; ore, local brown hematite; total annual capacity, 8,500 net tons. George G. Lobdell, president; Wm. W. Lobdell, secretary; P. N. Brennan, treasurer; J. H. Wissler, superintendent.

18. Locust Grove Furnace, Knauer & Morret, lessees, Douglassville, Pa. Furnace at Water Lick, Warren county, Va. One stack, 36½ x 8½, built in 1843, and abandoned some years afterwards; rebuilt in 1883; one iron-pipe hot-blast stove; closed top; ore, local hematite; product, pig iron used for the production of blooms; annual capacity, 3,500 net tons. Brand, "Locust Grove." Formerly called Elizabeth Furnace.

19 and 20. Milnes Furnace, Shenandoah Iron Co., Milnes, Page county. Two stacks, each 33 x 9, built in 1846 and 1857; hot blast; ore, Fox Mountain brown hematite; product, forge pig iron, all used for blooms. One of these stacks, called Catharine, built in 1846, has not been in blast for several years. The other, called Furnace No. 2, has an annual capacity of 3,000 net tons.

21. Mine Run Furnace, Powell's Fort Mining Co., Alexandria. Furnace at Mine Run Furnace P. O., Shenandoah county. One stack 32 x 7½, built in 1872; cold blast; open top; ore, brown hematite; mined on the property; product, gray forge and car-wheel pig iron. Brand, "Mine Run, Va." A. McLean, president; J. S. Barbour, vice-president; L. W. Reid, secretary; W. H. Marbury, treasurer; John C. Karsten, superintendent at the mine. Selling agents, Keyser Brothers & Co., Baltimore.

22. Mount Vernon Furnace, Abbott Iron Co., Baltimore, Md. Furnace near Weyer's Cave, Rockingham county. One stack, 35 x 8½ built in 1848, and rebuilt in 1874; cold blast; steam and water-power; closed top; ores, neutral hematites. Brand, "Mount Vernon."

23. Pierce Furnace, Foster's Falls Iron and Manufacturing Co., Foster's Falls, Wythe county. One stack, 35 x 8, built in 1881; open top; cold blast; ore, local hematite; product, car-wheel pig iron; annual capacity, 2,000 net tons. Brand, "Pierce." J. W. Robinson, president and Secretary; R. C. Hoffman, treasurer; J. J. Baker, manager. Formerly called New River Furnace.

24. Panther Gap Furnace, R. H. Bell, agent, Staunton. Furnace near Goshen, Rockbridge county. One stack, 38 x 9, completed in December, 1874; cold blast. Has made but one blast. Owned by Echols, Bell & Catlett, of Staunton, Va., and others.

25. Radford Furnace, Radford Iron Co., Radford Furnace P. O., Pulaski county. One stack, 35 x 10, built in 1868; warm blast; product, car-wheel pig iron for the Car-wheel Iron Co., Richard Wood, president, 400 Chestnut st., Philadelphia.

26. Reed Island Furnace, Reed Island Iron Co., Reed Island, Wythe county. Furnace in Pulaski county. Main office, Graham's Forge. One stack, 33 x 9, first put in blast April 28, 1881; cold blast; open top; water power; ore, local hematite; product, car-wheel pig iron; annual capacity, 2,000 net tons. Owners, J. W. Robinson, D. P. Graham, J. W. McGavock and R. C. Hoffman & Co. W. R. Tipton, superintendent.

27. Salisbury Furnace, Salisbury Iron Manufacturing Co., Salisbury Furnace, Botetourt county. New York office, 45 Exchange Place. One stack, 32x10, built in 1869; hot and cold blast, open top; water power; ore, hematite, mined on the furnace property; product, car-wheel pig iron; annual capacity, 4,000 net tons. Brand, "Virginia Salisbury." Eugene Kelly, president and treasurer, W. Plunket, secretary; H. S. Dakin, superintendent. Selling agents, A. Pleumer & Co., Cincinnati, Ohio.

28. Sinking Creek Iron Works, J. Willcox Brown, Newport, Giles county. One stack, 35x9½, built in 1873; warm blast; water power. E. P. Williams, superintendent.

29. Van Buren Furnace, Dr. Frank King, Van Buren Furnace, Shenandoah county. One stack, 37½x9, built in 1850; rebuilt in 1870; closed top; cold blast, but arranged for hot; ore, local hematite; product, car wheel pig iron; annual capacity 2,500 net tons. Brand "King."

30. Virginia Furnace, Waynesboro, Augusta county. One stack, 32x9, built in 1804: hot blast: ores, honey-combed and red and black hematite; product, foundry pig iron, very soft and strong. Brand, "Virginia," formerly called Mount Torrey Furnace.

31. Wythe Furnace, Crockett, Oglesby & Co., Graham's Forge. Furnace at Crockett Depot, Wythe county. One stack, 25x8, built in 1819, and rebuilt in 1873; open top; cold blast; ore, local red and brown hematite; product, car-wheel pig iron; annual capacity, 1,500 net tons. J. W. Robinson, Graham's Forge, part owner and general agent. Selling agents, R. C. Hoffman & Co., Baltimore.

3. Projected.

1. Harmer, Randle & Co., Luray, Page county. One stack projected. A. C. Harmer, president; Wm. Glading, vice-president; O. C. Brothers, treasurer; Arthur E. Randle, secretary.

Naturalists field clubs.—In the "Baltimore Sun" of the 18th, we find the following account of the "Baltimore Naturalists' Field Club," which we publish for the purpose of calling the attention, not only of our Virginia academies, colleges, and universities to the very great importance of having such clubs organized as part of their regular work, but also of urging that similar clubs be formed in every county in Virginia and West Virginia, for the purpose of doing for each of these counties what the Baltimore club is doing for its locality. One of the most attractive features of a great meeting of the British Association for the Advancement of Science that we attended at the thriving city of Belfast, Ireland, was the Naturalists' field club of that city; it was, in reality, a kindred association that received and worthily entertained the famous Association.

The "Sun" says: In the spring of 1880, in response to a feeling among Baltimore naturalists that there ought to be systematic field work in natural history, the Baltimore Naturalists' Field Club was organized at the Johns Hopkins University, with Dr. H. Newell Martin as president. For a number of years the Maryland Academy of Sciences had been interested in the study and preservation of collections of the flora, fauna and geological specimens of the region of Baltimore, but little regular outdoor work had been done excepting by Prof. P. R. Uhler, Mr. Lugger and a few others. The club was divided into botanical, zoological and geological sections, which at first worked over the same territory, but last year, to obtain more thorough results, each section selected its own basis of operations. The membership of the club is not confined to persons attending the university, but any one in Baltimore and vicinity interested in the subject is welcome to the organization. Every pleasant Saturday during the fall and spring the members make excursions into the surrounding country for the purpose of collecting every form of indigenous animal and plant life and such mineral specimens as are obtainable, and the results of the observations are made known to the club at its monthly mectings during the winter. In summer the members are scattered, but some continue their work. Last summer Dr. W. H. Howell was engaged in making a collection of the flora and fauna of July and August. Dr. Williams was, in company with Dr. Hitchcock, studying the geology of the Apalachian system by daily tramps in the White mountains, and Prof. Lugger, who is an indefatigable collector, was prospecting the Atlantic coast between Cape May and Chincoteague inlet. The explorations of the club have extended through the valleys of Gwynn and Jones falls, the Patapsco, the region around the Marine Hospital, the line of the Delta Railroad and the flats of Spring Gardens. One Saturday the naturalists went by rail to Ilchester and thence tramped across the country to the Western Maryland Railroad. To the uninitiated it is perfectly surprising to discover the different kinds of animal and vegetable life to be found during a search along Gwynn falls or in a stagnant pool on Moale Point. Besides the scientific results of such excursions, teachers and students, are quickened by common interest in the same subject, and the five or six hours spent in sunshine and fresh air suffice to remove the cobwebs from the minds of those who all the week have been engaged in severe brain work.

Each year the new students have experienced delay in the work in being compeled to spend some time in acquiring familiarity with the topography of Baltimore county, and the necessity for a suitable map has long been felt by the members of the club. The existing maps of the district are either too bulky or too inaccurate, and the only thing left was to make a map for the club. Last winter Mr. A. L. Webster of the university undertook to collect material for the construction of such a map, and, impressed by his report on the work, the trustees encouraged it. The results of his labor were commited to Mr. Gannett, chief topographer of the United States geological survey. The drawings were made by Mr. Louis Nell, of Washington, and the lithographing by Messrs Hoen & Co., of this city. The map is about twenty-five inches square, and can be folded and placed in a small case. It covers an area of twelve miles radius from the city hall, and shows, as far as could be learned, railroads, county and private roads, inns, well-known country residences, streams, &c. There is no attempt yet at topography, but as the map grows by suggestions from time to time, this will be added. The club, as reported in Thursday's "Sun," has reorganized for this season, and will continue to make its weekly trips, by which corrections will be made and new facts will be added in the map, which will be useful not only to the members of the club, but to any one who travels through the county.

A. U. S. Gen. Land Office mineral exhibit.—We have received the following circular from Hon. N. C. McFarland, Commissioner of the General Land Office of the U. S., Department of the Interior, Washington, D. C., under date of Oct. 15, 1884.—We hope all our mine owners will contribute to this collection, as it will only cost them the trouble of procuring samples and delivering them to the express agents, only remembering that this exhibit will not take the place of or obviate the necessity for the Collective Virginia exhibit, to which all mine owners and others interested in minerals are invited to contribute by sending specimens, which the railways will transport free, to Major Jed. Hotchkiss, Asst. U. S. Comr., to Staunton, Roanoke or Danville, as is most convenient.

The circular reads: This office proposes to send to the "World's Industrial and Cotton Centennial Exposition," to be held in the city of New Orleans, La., commencing December 1, 1884, an exhibit of the mining resources of the United States at the present time, comprising samples of ores and minerals taken at as late a period as possible from many of the most important mines.

You are respectfully requested to make a contribution to the above.

The samples will be properly labeled so as to give each mine credit for its specimen, and for this purpose it is desired that the accompanying blank be filled in.

Specimens should be addressed to the Commissioner of the General Land Office, Washington, D. C., and sent so as to reach there by the last of November.

These specimens will be the property of the United States, and kept on exhibition in this Office or the Smithsonian Institution after the close of the New Orleans Exposition.

Charges for transportation will be paid by the Government.

The form of label to be filled up and sent with the specimens is as follows:

Name of Mine:
Kind of mineral:
Date taken from mine:
Depth below the surface:
Probable assay:
Length of time mine has been worked:
Topography of country (whether hilly, &c.:)
Nearest postoffice:
Name of mine owner:

Capt. Wilson and John Vawter are prospecting in "The Knobs" range, in the vicinity of the "Dill" mine, for the Clinton ores, for which there promises to be a large demand.

Virginia Minerals for the N. O. Exposition.

(Continued from page 169.)

Below we continue the publication of the list of Virginia's minerals collected by Assistant U. S. Commissioner Jed. Hotchkiss, in charge of ores, minerals, etc., grouped by counties, giving consecutive numbers to those collected from each county followed by the name and address of each contributor and concluding with the collection number of such contributor followed by the general collection number of the commissioner in charge.

Lee.

The following were collected by Gen. Imboden. See under Wise.

1. Coal from "Imboden" seam, 10′ thick, from Crab Orchard, from 4,000 acres tract of Wm. Legg on Little Black mn. 10 ms. west from Big Stone Gap. (403).

2. Fossil iron ore, Clinton, No. V, 2 blocks, from Rufus A. Ayers' 3,000 acres tract on N. fork Clinch river above Ward's mill near junction of Powell mn. and Wallen ridge. (411).

Scott.

The following were collected by Gen. Imboden. See under Wise.

1. Coal from 6′ to 7′ bed, head of Stony and Stock creeks, south face of Powell mn., the lowest workable bed; from land of W. W. James & Co., Goodson, Va. (400).

2. Fossil iron ore, Clinton, from land of W. W. James, of Goodson, Va.,near head of Stony creek. (412).

3. Iron ore, brown hematite, from land of W. W. James, of Goodson, Va., near head of Stony creek. (413).

4. Tennessee marble, brown, block 16″x 11″x 7.″5, dressed, polished, etc.; from near Estillville, from land of Estillville, (Va.) Marble Co., E. B. Leisenring, Mauch Chunk, Pa., president. Estillville is located on this marble, and with it the streets of that town are macadamized and the foundation walls of its houses are built. (414).

5. Dark brown Tennessee marble, block 12″.5 x 11″x 7″, polished, etc., from "Bounds" tract of Estillville Marble Co. 4 ms. west from Estillville. (415).

6. Dappled-gray marble, block 14″.5 x 12″x 8″, polished, etc.; from land of Estillville Marble Co. 3 ms. west from Estillville. (416).

7. Cherry-spot marble, block 12″x 10″x 5″, dressed, etc.; from land of Estillville Marble Co. 3 ms. west from Estillville. (417).

8. Pebble marble, block 12″x 9″x 6″, dressed, polished, etc.; from land of Estillville Marble Co., "Bounds" tract, 4 ms. west from Estillville. (418).

These specimens of marble are all exceedingly beautiful, in fact none can be more so; they cut easily and take a fine polish, as their appearance shows and as Mr. J. E. Chapman, marble cuter, of Goodson, Va., in whose yard these blocks were cut and finished, testifies. The quarries from which they came are very extensive, extending for miles alongside the track of the projected and now partially completed South Atlantic & Ohio Railroad.

Franklin.

From Prof. Fontaine. See under Albemarle.

4. Magnetic iron ore from Rocky Mount. 36. (302).

3. Magnetic iron ore from Rocky Mount mines. From Capt. F. J. Chapman, Salem. 53. (257).

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The following specimens were contributed by Mr. A. E. Randle, of Luray; they represent over 30 miles of the length of the Potsdam, No. I, range of ores in Va., and several miles of the Valley limestone, No. II, range.

1. Brown hematite iron ore from "Bonanza" mine of Harmer, Randle & Co., 2¼ ms. S. E. from Rileyville, S. V. RR., in No. I. (426).

2. Brown hematite from "Audenried" mine of Va. Ore & Iron Co. (Limited) of Luray; in No. II, in "Isabella furnace" range, 1⅛ ms. N. W. from Kimball station, S. V. RR. Mr. Randle reports analysis as 48.037 met. iron, 0.121 phosphorus, and 0.031 sulphur; and that about 100 tons of ore are now shiped weekly from this mine. (427).

3. Brown hematite from "Shank" mine of A. E. Randle, ¼ m. S. of Vaughan summit, S. V. RR. (428).

4. Brown hematite from "Weatherhols" mine of A. E. Randle, 1 m. S. from Kimball sn. S. V. RR. (429).

5. Brown hematite from "Pipe-ore" mine of A. E. Randle, in No. II, in "Isabella furnace" range 2½ ms. N. W. from Luray. (430).

6. Brown hematite from "Williams" mine of A. E. Randle; "shot" ore, in No. II, 2 ms. West from Luray. (431).

7. Brown hematite from "Murray" mine of A. E. Randle in No. II, "Isabella furnace" range, 2 ms. W. from Luray. (432).

8. Brown hematite from "Piney mountain" mine of Harmer, Randle, & Co., in No. I, 3 m. E. from Marksville. (433).

9. Brown hematite from "Printz" mine of Harmer, Randle, & Co., ½ m. S. from above. (434).

10. Brown hematite from "Vulcan" mine of Maris & Randle, 1 m. S. from Marksville sn., S. V. RR., above Ochre beds trestle. Mr. Randle reports this as from a 17 ft. thick bed that analyzes 58.03 met. iron, 0.093 phosphorus and 0.136 sulphur. The ore from this mine has been shiped to Danville Furnace Co., Danville, Pa.; some 20 tons a day are now being mined. (435).

11. Brown hematite from "Honey run" mine of Harmer, Randle, & Co., on Honey run ¼ m. below S. V. RR. (436).

12. Brown hematite from "Housen" mine of Harmer, Randle, & Co., ¼ m. N. from Honey run, near Honeyville. (437).

13. Brown hematite from "Farmazanta" mine of Harmer, Randle, & Co., ¾ m. south from "Housen" mine. (438).

14. Brown hematite from "Dovel" mine of Harmer, Randle & Co., ½ m. S. E. from S. V. RR. at E. Liberty. (439).

15. Brown hematite from "East Liberty" mine of Miles & Randle, ½ m. above E. Liberty trestle of S. V. RR. (440).

From Prof. Fontaine. See under Albemarle.

16. Epidote; occurs in syenite at Milam gap on W. side of Blue Ridge. 59. (325).

Albemarle.

The following specimens are kindly loaned by Prof. Wm. M. Fontaine of the University of Virginia from his collection.

24. Slate, with dendritic markings, from Albemarle Slate Co's quarry. 13. (279).

25. Granitic granulite, suitable for mill stones, from Moorman river, where it is in vast quantities. 14. (280).

26. Sandstone from Moorman river, from point west of Whitehall: very abundant. 15. (281).

27. Metamorphic conglomerate, from Rockfish Gap tunnel, C. & O. Ry. 16. (282).

28. Epidosite from Rockfish Gap tunnel, C. & O. Ry. 17. (283).

Amherst.

From Prof. Fontaine. See under Albemarle.

8. Syenite; occurs in large quantities at Balcony Falls, on E. side of gorge. 18. (284).

9. Syenite; on Piney river in large quantities. 19. (285).

10. Granulite; in large quantities at Balcony Falls, on James river and R. & A. RR.; would make a handsome building stone. 20. (286).

11. Bornite and stalactitic copper ores; from Dr. Chas. Slaughter's. 21. (287).

22. Magnetic iron ore; from 4 ft. ledge of solid ore on Indian creek. 22. (288).

Augusta.

From Prof. Fontaine. See under Albemarle.

1. Brown hematite iron ore, from Kennedy tract, foot of Blue Ridge, in considerable amounts. 23. (289).

2. Jointed sandstone from Blue Ridge near Black Rock spring. 24. (290).

3. Ochre, from Samuel Steele's, near Fishersville, where in large amounts. 25. (291).

4. Mica slate with chlorite spots, from west end of Rockfish Gap tunnel. Exists in considerable amounts. 26. (292).

5. Stalactitic marble, from near Greenville. 17. (293).

6. Quartz crystals from near Waynesboro. 28. (294).

7. Ochre, from Samuel Steele's, in large amounts. 29. (295).

Campbell.

From Prof. Fontaine. See under Albemarle.

1. Kyanite, from J. J. Hardwicke, Lynch sn., Va. Mid. RR. 30. (296).

Carroll.

From Prof. Fontaine. See under Albemarle.

8. Copper pyrites from Wildcat mine, near Hillsville. 31. (297).

9. Copper pyrites in magnetic pyrites, from Cranberry mine, near Hillsville. 32. (298).

10. Magnetic pyrites; occurs in immense quantities in massive ledges. 33. (299).

11. Mica schist; occurs in large amounts near Hillsville, and is well suited for quarrying. 34. (300).

Floyd.

From Prof. Fontaine. See under Albemarle.

3. Arsenical iron with 32 ounces of silver to the ton; from upper waters of Roanoke river. 35. (301).

Greene.

From Prof. Fontaine. See under Albemarle.

1. Syenite from Blue Ridge at Swift Run Gap, where abundant; would make a handsome and durable building stone. 37. (303).

Hanover.

From Prof. Fontaine. See under Albemarle.

1. Gneiss with Garnets, from near Noel sn. C. & O. Ry. 38. (304).

2. Orthoclase feldspar crystals, from Mica mine near Noel sn., C. & O. Ry. 39. (305).

Henrico.

From Prof. Fontaine. See under Albemarle.

6. Lignite, from "Dutch Gap" on James river. 40. (306).

Louisa.

From Prof. Fontaine. See under Albemarle.

17. Gneiss. Occurs in large amounts on North-Anna river at Holliday's mill. 41. (307).

18. Itacolumite; from the "gold belt," near Tolersville, and a little E. from the pyrites deposits. 42. (308).

19. Specular iron ore from Green Springs neighborhood. Not seen in place. 43. (309).

Loudoun.

From Prof. Fontaine. See under Albemarle.

1. Specular iron ore, near Leesburg, said to be in quantity. 45. (310).

2. Chalcopyrite, from near Leesburg; said to be a promising vein. 44. (311).

Madison.

From Prof. Fontaine. See under Albemarle.

1. Mica schist from near Madison C. H.; occurs in large quantities and makes a good building stone. 46. (312).

2. Diorite. Occurs in heavy masses with the next. 47. (313).

3. Diorite; from an immense dyke, seemingly 1,000 feet wide, in E. foot of Blue Ridge on Milam Gap road. 48. (314).

4. Metamorphic diorite; from ledge 2½ ms. W. from C. H. on Milam Gap road. 49. (315).

5. Variety of Syenite that occurs with Unakite at Milam Gap of Blue Ridge. 50. (316).

6. Variety of Syenite that occurs with unakite at Milam Gap of Blue Ridge. 51. (317).

7. Unakite; occurs in syenite on top of Blue Ridge at Milam Gap. 52. (318).

8. Unakite; same place as above. 53. (319).

Montgomery.

From Prof. Fontaine. See under Albemarle.

4. Galena; occurs in considerable quantity in limestone, near Alleghany Springs. 54. (320).

Nelson.

From Prof. Fontaine. See under Albemarle.

10. Magnetic iron ore, from Moore's near Faber sn., Va. Mid. RR. 55. (321).

11. Manganese oxide, from Simpson's mine, near Midway Mills. 56. (322).

12. Hornblende and garnet in quartzose rock near Faber's mills. 57. (323).

13. Rutile, occurs in gneiss, often in large masses. 58. (324).

Prince Edward.

From Prof. Fontaine. See under Albemarle.

2. Bornite and Malachite copper ores. 60. (326).

Prince William.

From Prof. Fontaine. See under Albemarle.

1. Lignite, from Neabsco creek on Telegraph road. 61. (327).

2. Silicified wood, from Neabsco creek, Telegraph road. 62. (328).

Rockingham.

From Prof. Fontaine. See under Albemarle.

1. Diorite. Occurs in an eruptive dyke, 200 ft. wide, near top of Blue Ridge. 67. (333).

2. Epidotic Jasper, from ledge 8 ft. wide, in chlorite schist, at Swift Run gap of Blue Ridge. 68. (334).

3. Syenite; occurs in immense quantities in the Blue Ridge on the Swift Run Gap road. 69. (335).

Rockbridge.

The following specimens are kindly loaned by Prof. John L. Campbell, from the "Virginia Division of the Cabinet of Washington and Lee University," Lexington, Va. This contribution is a typical one of the iron ores of this county in its eastern and western borders.—The numbers first given at the end of each description are those of the University cabinet; those in parentheses are the numbers of the Va. mineral exhibit.

28. Limonite iron ore, fibrous, from Graham's bed on Irish creek. 50. (260).

29. Limonite, massive, from same locality as above. 51. (261).

30. Limonite, massive, from "Echols" mine near Balcony Falls. 52. (262).

31. Limonite, fibrous, from same locality as above. 53. (263).

32. Limonite, massive, from Victoria furnace mines, near Rockbridge Alum Springs. 54. (264).

33. Limonite, from same locality as above. 55. (265).

34. Limonite, fibrous and radiated, from Glenwood mines, Western Blue Ridge. 56. (266).

35. Baryta, from near Lexington. 105. (267).

36. Dufrenite, (Hydrated phosphate of iron), fibrous divergent; from Blue Ridge, (South mountain), Irish creek region, 12 ms. E. from Lexington. This is the only locality of this mineral, so far as known, in any of the Southern states. 210. (268).

37. Dufrenite, nodular, radiated; from same place as above. 211. (269).

38. Dufrenite, incrustation with concentric layers; from same place as above. 212. (270).

39. Cassiterite, Tin ore, massive; from Irish creek region of Blue Ridge. 855. (271).

40. Tin ore; cross section of crystaline vein; from same place as above. 856. (272).

41. Tin ore, group of crystals on gangue of quartz and yellow mica; from same place as above. 857. (354).

42. Gray coraline marble from near Lexington; dressed and polished samples from Mr. John Hileman, marble cuter, Lexington. (353)

From Prof. Fontaine. See under Albemarle.

43. Ochre; from outcrop of cement Limestone on James river. 63. (329).

44. Magnetic iron ore; occurs in large amounts at Robert Grant's on Irish creek. 64. (330).

45. Hornblendie granite; occurs on Tye River Gap road on W. side of Blue Ridge. 65. (331).

46. Brown hematite iron ore from "Carson" ore beds of J. E. A. Gibbs of Raphine. 66. (332).

Chesterfield.

5. Crude yellow Ochre from mines of Bermuda Ochre Co. near Bermuda Hundred: B. A. Davis, Petersburg, superintendent. (337).

6. Manufactured Yellow Ochre, from above; considered by the manufacturers of it equal to the best French. (337).

7. Iron ore, hematite, from 3" to 12" thick over beds from which above ochre is obtained; makes good metalic paint. Probably the ore used in the first iron works built in America. From B. A. Davis, Petersburg. (357).

Augusta.

1. Manganese from "Fauver" beds 1½ miles from Vesuvius sn. Shen. Valley RR.; from 450 acres tract, minerals of which are owned by Rawlings & Ingersoll, of Vesuvius, Va. Analysis by Dr. Hy. Froehling, Richmond, Va., of average sample of a shipment of 50 tons, gave: Manganese binoxide 71.60, iron sesquioxide 6.34, phosphoric acid 0.1028; metalic manganese 45.25, phosphorus 0.45. About 400 tons of ore have been shiped from this property to Liverpool, Eng., and Johnstown and Pittsburg, Pa. At Pittsburg it has been used in the manufacture of spiegeleisen, with good results. 1. (258).

2. Brown hematite iron ore from "Fauver" tract, owned, etc, as above. The iron ore on this property has not been developed, but there is a large amount of "float" on the surface and it is in the "ore range" of this region. 2. (259).

Smyth.

The following specimens were obtained by Mr. James H. Gilmore of Marion.

3. Iron ore from lands of Thomas E. Gardiner. (273).

4. Iron ore from lands of M. B. Tate. (274).

5. Iron ore from lands of John M. Preston. (275).

6. Barytes, two samples, from land of G. C. Goodell. (276).

7. Soapstone, a kaolin, from land of A. G. Pendleton. (277).

8. Gypsum, plaster, from land of J. H. Buchanan. (278).

9. Brown Hematite iron ore; occurs in large amounts east of Marion. From Prof. W. M. Fontaine. 70. (336).

Loudoun.

The following were contributed by the Eagle Mining Co., of Leesburg, from its mines, by Frank A. Wise, general manager, Leesburg.

1. Carbonate of copper, from vein 3' wide developed to 25' deep. Assays, by Oxford Copper Co of New York, give 51 per cent of copper, and 27 ounces of silver per ton. (340).

2. Sulphuret of copper from vein 10" wide, developed to 50' deep. Assays, by Oxford Copper Co. of N. Y., give 12½ per cent of copper. (341).

3. Iron ore, from vein 4' wide and 50' deep; yields 55 per cent met. iron by assay of W. P. Lawver, of U. S. Mint. (342).

4. Sulphuret of copper, from vein developed 50'; yields 11 per cent of copper, and 1 oz. of silver per ton, by assays of W. P. Lawver of U. S. Mint. (343).

5. Carbonate of copper—Red oxide and Glance—from vein 3' wide, developed 25' deep. Yields 50 per cent met. copper and 27 oz. of silver per ton, by assays. (344).

6. Iron ore, from vein 2' to 4' wide, developed 50'; yields 55 per cent met. iron. (345).

7. Oxide of copper from carbonate vein, developed 60' on vein 4' wide and 25' deep. (346).

8. Sulphuret of copper from vein 8" to 15" wide, developed 50'. (347).

9. Iron ore. (348).

10. Barytes, Heavy spar; vein undeveloped. (349)

11. Iron ore from 50′ level of Eagle Mg. Co. shaft (350).

12. Crystal spar from Iron vein of Eagle Mg. Co. (351).

12. Marble from quarry of Va. Marble Co. 3 ms. E. from Middleburg; from a deposit that has been explored by excavating and boring and proved to be of great extent. The marble has been pronounced to be of a very superior quality. Contributed by Major B. P. Noland, of Middleburg. (361).

13. Marble, from same as above. (362).

14. Marble, from same as above. (363).

Buckingham.

3, Gold in quartz from Morrow mine; W. S. Morrow, Buckingham C. H. (338).

Giles.

2. Marble, from Charles H. Snidow, Kimballton. (339).

Rockingham.

4. Case of Chalybeate water from the noted Rawley Springs, 11 ms. north-west from Harrisonburg in mts. west of Shenandoah Valley. J. P. Houck, Harrisonburg, president; J. Watkins Lee, general manager. (88).

5. Galena (lead sulphuret) from Daniel Showalter's farm near Chrisman P. O. In lead in Valley limestone, No. II, on west side of Shenandoah Valley. Contributed by Maj. Geo. Chrisman. (355).

The following specimens were contributed by C. D. Harnsberger of Port Republic, collected from western base of Blue Ridge:

6. Two samples iron ore, limonite, from the Potsdam, No. I. from the "Miller" bank of the Mt. Vernon Iron property of Abbott Iron Co. of Baltimore, Md , near Weyer's Cave station, S. V. RR. Ore abundant at this mine and cheaply mined. 1. (421).

7. Iron ore, limonite, from "Raines" ore bank of Abbott Iron Co., 3 ms. N. E. from Port Republic sn. S. V. RR.; found in strata from 1′ to 10′ thick; not worked since 1880. 2. (422).

8. Iron ore, limonite, from "Weaver" bank, near 120-mile-post siding of S. V. RR., from property of Abbott Iron Co. Ore abundant and near the surface; reported to be cold-short; not worked since 1879. 3. (423).

9. Iron ore, limonite, from "Sipe" bank of Abbott Iron Co., from near 120-mile-post siding of S. V. RR. A cold-short ore, probably very abundant; mine not worked since 1874. 4. (424).

Shenandoah.

The following are from the furnace property of Mrs. A. J. Myers, at Shenandoah Alum Springs P. O., near head of Stony creek, in ms. west of Shenandoah Valley.

3. Iron ore from Powder-spring bank.—4. Iron ore from Open bank on Iron Hill.—5. Iron ore from extensive outcrop near furnace stack.—6. Limestone from near furnace.—7. Fire-clay and brick from same.—8. Shales and other rocks from vicinity of furnace. (176).

The following mineral waters are contributed by Mrs. A. J. Myers, from the Shenandoah Alum Springs property, all from within a circle of 300 yards. She claims that this is the greatest variety of mineral waters of medicinal value from any one locality.

9. Shenandoah Alum water; claimed to be the best of its class.—10. Sulphur Iron water.—11. Arsenic water.—12. Eager water.—13. Chalybeate water.—15. Lithia-sulphur water.—15. Alum shale from which the above alum water flows. (356).

Augusta.

10. Ochre from Samuel Steele's near Fishersville, from bed 18″ thick in well 12,′ deep. Contributed by Col. J. M. McCue. (367).

11. Brown iron ore, limonite, fibrous, radiated; two lumps, 50 lbs. each; from "Mine" bank in Potsdam, No. I, near head of S. river of the James in Wn. Blue Ridge, from lands of A. A. Low of New York. Obtained by W. H. Cash. (368).

12. Iron ores, brown hematite and red shale, from mines of Buffalo Gap furnace. of Virginia Iron & Steel Co , Buffalo Gap station, C. & O. Ry. (369).

13. Pig iron from Buffalo Gap furnace of Va. I. & Steel Co., Buffalo Gap station; C. & O. Ry. (370).

14. Limestone, Lower Helderberg, No. VI, from quarry at Buffalo Gap that supplies flux to Buffalo Gap furnace. (371).

15. Iron ore, from banks in No. VII, Oriskany, that supply Elizabeth furnace at Ferrol station, C. & O. Ry. From Samuel Forrer, Mossy creek. (90).

16. Limestone, from No. VI beds at Elizabeth furnace, where used for flux, Ferrol station, Ches. & Ohio Ry. From Samuel Forrer, Mossy creek. (91).

17. Marble, polished slab and blocks, from quarry of Coral Marble Co., in Lower Helderberg, No. VI, on C. & O. Ry., near Craigsville. Quite extensively worked and a large quantity shiped to northern markets. R. P. Bell, Staunton, superintendent. (372).

18. Brown iron ore from old Mossy creek mines in Formation No. II; mines that supplied the old Mossy Creek furnace. From Samuel Forrer, Mossy creek. (373).

19. Marble, encrinal, from land of Martin K. Garber, Marble Valley, Big Calf-pasture river. (374).

20. Manganese ore, pyrolusite, mammillary forms, from Crimora mines near Crimora station, S. V. RR. These mines are worked extensively, and have supplied a large quantity of high grade ore. Contributed by Samuel H. Donald. (375).

21. Brown iron ore from Kennedy mine of old Kennedy furnace property, W. foot of Blue Ridge opposite Stuart Draft station of S. V. RR. (376).

22. Kaolin, washed china clay, from beds of Va. China Clay & Fire brick Co., J. S Lipscomb, superintendent, Lipscomb sn., S. V. RR (377).

23. Fire bricks of high grades for all purposes, from Virginia China Clay & Fire Brick Co., J. S. Lipscomb, superintendent, Lipscomb sn. and p. o., Shenandoah Valley RR. (378).

24. Iron ore from deposit in Valley limestone, No. II, from George Seawright, Stonewall P. O. (89).

25. Stalactites, stalagmites, calcspar, encrusted articles, etc., etc.; a large and splendid collection of over a hundred specimens from the magnificent formations peculiar to the famous Weyer's Cave, on bank of South river of Shenandoah, near Weyer's Cave station of Shenandoah Valley RR. Presented to Jed Hotchkiss by J. L. Mohler, manager of Weyer's Cave, and by him sent to N. O. Exposition. (222).

26. Tufaceous or calcareous marl, recent deposit from water of Lewis creek, near Staunton; with casts of leaves of trees now growing along the creek. This has been ground and used as a fertilizer; it makes a good blast furnace flux and burns into an excelent lime. From cabinet of Jed. Hotchkiss. (379).

27. Sand-rock, from No. IX, Catskill, from summit of Mount Rogers, 4,500 feet above tide, on line of Ches. &

Ohio Ry., near North Mountain station. This is from a bald knob in the Big North Mountain range on the western side of the Great Valley of Virginia. Contributed by of Ferrol. (380).

28. Anthracite coal from Dora coal mine in North River gap, north from Stribling Springs, from formation No. X, the Vespertine; from bed that has been worked considerably for local purposes. Contributed by Samuel Forrer, Mossy Creek. (381.)

29. Slate, "slickensided" or polished by friction of rocks in a great downthrow of geologic formations. From Dora coal mine. Cabinet of Jed Hotchkiss. (382).

30. Two large stalactites and one stalagmite, two boxes, from The Fountains Cave, one of Virginia's remarkable and wonderful caverns, near the South river of the Shenandoah and Weyer's Cave station of Shenandoah Valley RR. (420).

31. Iron ore, limonite, cubical black, 12" by 16", from Elizabeth furnace ore beds, in Oriskany, No. VII, at Ferrol station, Ches. & Ohio Ry. Va. Agr. dept. 23. (452).

Buchanan.

1. Coal from Indian creek; contributed by Elijah Rasnick, Sr.; of Pat's Store, Russell county. (358).

Dickenson.

1. Coal from Kana creek; contributed by Elijah Rasnick, Sr., of Pat's Store, Russell county. (359).

Russell.

2. Coal from Chana creek; contributed by Elijah Rasnick, Sr., of Pat's Store, Russell county. (360).

James City.

2. Phosphatic greensand marl, ground, for basis of "Carter's Grove Fertilizer;" from Carter's Grove plantation on James river. Contributed by Hon. E. G. Booth. (364).

Washington.

3. Limestone, highly fossiliferous, block 8" cube; from N. fork of Holston river at Mendota, 13 miles N. W. from Goodson. Used for masonry of bridge of South Atlantic & Ohio RR. across N. fork of Holston at Mendota. From Gen. J. D. Imboden, Bristol, Tenn. A recent analysis by Dr. Hy. Froehling of a sample of this limestone, dried at 212°F, gave: organic matter 0.380; silica 2.180; alumina and iron oxide 1.677; carbonate of lime 93.597; carbonate of magnesia 1.967; phosphoric acid 0.073; sulphuric acid 0.171; total 100.045. (383).

4. Grindstone, 15" by 4"½, from a surface sample, from a massive bed of hard grit rock at the mouth of Whetstone branch of Wolf creek 10 ms. N. W. from Goodson, on line of S. A. & O. RR. Grindstones from 6' to 10' in diameter, without a flaw, can be quarried from this bed. From Gen. J. D. Imboden, Bristol, Tenn. (384).

5. Red calcareous rock, very hard, suitable for a fine building stone, from stratum over 30' thick, near Mendota. From Gen. J. D. Imboden. (385).

6. Limestone, Valley or No. II, from one mile west from Goodson. From Gen. J. D. Imboden, Bristol, Tenn. (386).

7. Barytes. Va. Agr. dept. 6. (430).

Middlesex.

1. Blue marl from Robert Healey's. Va. Agr. dept. 3. (428).

2. Shells, pebbles, etc., from Dr. J. Mason Evans. Va. Agr. dept. 4. (428).

Montgomery.

The following were contributed by Maj. John T. Cowan, Cowan's Mills P. O.

5. Millstone grit, suitable and used for mill-stones, from Brushy mn., N. E. from New river and 4 ms. from Churchwood sn. of N. & W. RR. (387).

6. Coal, semi-anthracite, from Formation No. X, Vespertine, from McCoy's mine on N. E. bank of New river in Brushy mn., ¼ m. from Sifford tank of N. & W. RR. Now worked by J. T. Harper. (388).

7. Slate, suitable for marbleizing, flags, etc., from Poverty valley of Toms creek, E. slope of Brushy mn. (389).

8. Red shale iron ore, No. V., from Webb mine in Gap mn.; ore used at Sinking Creek Iron Works, Giles Co. (390).

Pulaski.

3. Anthracite coal from Belle-Hampton Coal Co. mine in Brushy mn., 4 ms. S. W. from Churchwood sn. N. & W. RR. Connected by tramway with Sifford tank switch of N. & W. RR., and now worked. (391).

Alleghany.

17. Limonite iron ore from Iron Mountain mines of Iron Mining & Mfg. Co., of Covington, on Pounding Mill run; connected with C. & O. Ry. by branch road. (365).

18. Stalactites, stalagmites, and other cave rocks from a cave in Lower Helderberg, No. VI, limestone near Low Moor station, C. &. O. Ry.: contributed by Mr. Jas. D. S. Chalmers. (366).

The following fine collection is from the mines, quarries, coke ovens and blast furnaces of the Longdale Iron Co., all, except the coke ovens, in the valley of Simpson creek and connected by narrow-guage railway with the Chesapeake & Ohio Ry. at Longdale station. They were kindly furnished by Capt. J. E. Johnson, the manager of the company, Longdale, Va.

19-23. Five boxes of pig iron, grades from No. 1 to mottled, inclusive, with the characteristic cinder for each grade, from the Longdale furnaces. (392).

24. Box of Lower Helderberg, No. VI, limestone, that used for flux in the Longdale furnaces. (393).

25. Box of coke used in Longdale furnaces, from the "Sewell" coal bed and ovens of Longdale Co. at Sewell, W. Va., from New River or No. XII, Lower measures coal. (394).

26. Box of lump ore, brown hematite, from Oriskany, or No. VII, from mines of Longdale Co. in Brushy mn. near head of Simpson creek. (395).

27. Unwashed ore or pay dirt of above mines. (396).

28. Washed ore of above mines. (397).

29. Refuse from the washer in washing above ore. (398).

30-31. Clay and flint from top and bottom, respectively, of above iron mines. (399).

32. Lump of Cadmia from deposition from fumes in throats of Longdale blast-furnaces. (419).

Floyd.

The following are from the collection of the Va. Dept. of Agriculture.

4. Steatite, from near Floyd C. H. 19. (442).

5. Gold ore, from Brush creek, from W. H. Harman, Floyd C. H. 20. (443).

6. Kaolin, from near Floyd C. H.; from W. H. Harman. 21. (444).

Northumberland.

1. Meiocene marl from farm of Levi H. Gulick, Northumberland C. H. Va. Agr. dept. 2. (427).

Gloucester.

1. Fossil shell with quartz incrustation, from Gloucester Point. Va. Agr. dept. 1. (426).

King William.

1. Marls and fossils from Dr. Croxton's. Va. Agr. dept. 7. (431).

Lunenburg.

1. Glass sand, from R. H. Hatchett's, Wattsboro. Va. Agr. dept. 8. (432).
2. Quartz and pyrite, from Mr. Golding's. Va. Agr. dept. 9. (433).

New Kent.

1. Phosphate rock from R. H. Lacy's, "Mt. Pisgah;" contains, by analysis of Dr. W. J. Gascoyne, chemist of Va. Agr. dept. 23.20 per cent phosphoric acid; equal to Bone phosphate of lime 50.65. Va. Agr. dept. 10. (433).
2. Iron ore. Va. Agr. dept. 11. (434).
3. Greensand marl from J. P. Pearson's, Tunstall. Va. Agr. dept. 12. (435).
4. Shell marl, from Tunstall. Va. Agr. dept. 13. (436).
5. Shell marl, from St. Peter's church. Va. Agr. dept. 14. (437).

York.

1. Pectens; scallop shells, bank of York river. Va. Agr. dept. 5. (429).
2. Marls, fossils, shells, coral, Tertiary limestone cut into millstone, from bluffs of York river near Yorktown. Va. Agr. dept. 15. (438).

Brunswick.

1. Granite. Va. Agr. dept. 16. (439).

Isle of Wight.

1. Yellow marl from Stephen H. Urquhart's. Va. Agr. dept. 17. (440).

Surry.

1. Yellow marl from Blair Pegram's. Va. Agr. dept. 18. (441).

Bedford.

The following are from the collection of the Va. Dept. of Agriculture.

3. Kyanite, from J. A. Davis. 44. (467).
4. Hematite iron ore; Bedford Iron Co. 45. (468).
5. Red hematite; Bedford Iron Co. 46. (469).
6. Zinc ore; calamine; J. A. Davis. 47. (470).
7. Magnetic iron ore; J. A. Davis. 48. (471).
8. Flint; J. A. Davis. 49. (472).
9. Pyritous mica slate· J. A. Davis. 50. (473).
10. Conglomerate. 51. (474).
11. Hornblende crystals in quartz. 52. (475).
12. Pyrite in quartz; Graves'. 53. (476).
13. Salts deposited from aluminous shales; N. B. Updyke. 54. (477).
14. Aluminous shales from which above effloresced; N. B. Updyke. 55. (478).
15. Quartz, crystals. 56. (479).
16. Pyrite, etc.; J. W. Murrell. 57. (480).
17. Magnetic iron ore; from Goose creek. 58. (481).
18. Hornblende gneiss. 59. (482).

Carroll.

The following are from the Va. Dept. of Agriculture.

12. Iron ore, hematite. 22. (445).
13. Iron ore, Limonite from Martin Dalton. 24. (446).
14. Lead ore, from Martin Dalton. 25. (447).
15. Iron ore, from Martin Dalton. 26. (448).
16. Gneiss, from Ira J. McGrady. 27. (449).
17. Mica slate, from I. J. McGrady. 28. (450).
18. Iron ore, from Martin Dalton. 29. (451).

Patrick.

The following are from the Va. Dept. of Agriculture.

1. Hornblende. 30. (453).
2. Magnetic iron ore from Judge Lybrook's. 31. (454).
3. Copper ore, low grade. 32. (455).
4. Steatite. 33. (456).
5. Mica. 34. (457).
6. Limonite. 35. (458).

Bland.

The following are from the Va. Dept of Agriculture.

15. Chert in limestone in form of moccason. 36. (459).
16. Ochre and iron ore, from Iron mn. 37. (460).
17. Iron ore, red, from Round mn. 38. (461).
18. Tufaceous marl, deposit from water. 39. (462).
19. Lead and zinc ores. 40. (463).
20. Manganese. 41. (464).
21. Barytes on limestone. 42. (465).
22. Feldspar. 43. (466).

Fairfax.

The following are from the Va. Dept. of Agriculture.

1. Soapstone; Edward Fitzhugh. 79. (502).
2. Iron ore; J. J. Ratchford, Vienna. 80. (503).
3. Potter's clay; Edward Fitzhugh. 81. (504).
4. Coal, Jura-Trias; 82. (505).
5. Lignite, Jura-Trias; Vienna. 83. (506).
6. Mica schist. 84. (507).
7. Kaolin, Edward Fitzhugh. 85. (508).

Spotsylvania.

The following are from the Va. Dept. of Agriculture.

1. Iron ore. 86. (509).
3. Decomposed pyrite. 87. (510).

Chesterfield.

The following is from the Va. Dept. of Agriculture.

8. Granite, from Old Dominion Granite Co's quarries on James river. 88. (511).

Loudoun.

The following is from the Va. Dept of Agriculture.

17. Copper ore; James Pinkham. 89. (512).

Cumberland.

The following are from the Va. Dept. of Agriculture:

1. Iron ore, lean; Lyon A. Agee. 89. (513).
2. Iron ore; Dr. J. M. Blanton. 90. (514).
3. Magnetite; Col. J. E. Wood, near Ca Ira. 91. (515).
4. Lignite; Dr. J. M. Blanton. 92. (516).

Amelia.

The following are from the Va. Dept. of Agriculture:

13. Mica; A. Rusherford, C. H. 93. (517).
14. Mica; Hall. 94. (518)
15. Kaolin, fine quality. 95. (519).
16. Quartz, glassy. 96. (520).
17. Feldspar. 97. (521).
18. Amazon stone. 98. (522).

Grayson.

The following are from the Va. Dept. of Agriculture.

3. Hematite iron ore. 60. (483).
4. Pyrite; S. M. Dickey. 61. (484).
5. Chalcopyrite; H. Williams. 62. (485).
6. Gneiss; H. Williams. 63. (486).
7. Magnetite. 64. (487).

Tazewell.

The following are from the Va. Dept. of Agriculture:

4. Fossil, in limestone. 65. (488).
5. Iron smelted from Poor Valley ore in a common smith's forge; J. R. Witten. 66. (489).
6. Limonite iron ore, from Poor Valley; Harvey Peets. 67. (490).
7. Fossil iron ore. 69. (492).
8. Red iron ore, magnetic. 70 (493).
9. Limonite, brown iron ore. 71. (494).
10. Manganese. 72. (495).

Lee.

The following are from the Va. Dept. of Agriculture.

3. Fossil iron ore, Clinton, or No. V. 73. (496).
4. Fossil iron ore, Clinton. 74. (497).
5. Limonite, brown iron ore. 75. (498).

Powhatan.

The following are from the Va. Dept. of Agriculture.

2. Graphite; Dr. W. H. Cahart, Jefferson P. O. 76. (499).
3. Feldspathic gneiss. 77. (500).
4. Kaolin; Dr. W. H. Cahart. 78. (501).

Nottoway.

The following are from the Va. Dept. of Agriculture.

1. Steatite, from Nottoway C H.; J. R. Tuggle. 68. (491).
2. Kaolin; G. Hudders, Bellefonte. 105. (529).

Stafford.

The following is from the Va. Dept. of Agriculture:

1. Gold-bearing quartz; A. Manuel. 99. (523).

Prince Edward.

The following are from the Va. Dept. of Agriculture:

3. Copper ore. 100. (524).
4. Quartz, fluor-spar, and pyrite; L. R. Rowlett, Green Bay. 101. (525).
5. Kaolin balls, three; from 4 ms. from Prospect sn.; G. W. Bell, Pamplin City. 102. (526).
6. Mica; R. B. Wilson, Green Bay. 103. (527).
7. Greenstone. 104. (528).

Hanover.

The following are from the Dept. of Agriculture:

3. Marl; Dr. Christian, St. Peter's church. 106. (530).
4. Asbestus; Leake, Rockville. 107. (531).
5. Shale; Little river. 108. (532).
6. Lignite; Jura-Trias. 109. (533).
7. Marl; Geo. L. Ernest, Old Church. 110. (534).
8. Greensand marl; Gen. Wickham, Hickory Hill. 111. (535).
9. Greensand marl; Gen. Wickham, Hickory Hill. 112. (536).
10. Coprolites; from Bassett farm on Pamunkey river. Contain, by analysis of Dr. W. J. Gascoyne, chemist of Va. Dept. of Agr. 23.47 per cent phosphoric acid, equivalent to 51.23 per cent of bone phosphate of lime. 115. (537).
11. Bones, etc.; from Bassett farm, on Pamunkey river. Contain, by analysis of Dr. Gascoyne, 34.29 per cent phosphoric acid, equivalent to 74.85 per cent bone phosphate of lime. 116. (538).
12. Olive earth; from Bassett farm, on Pamunkey river. Contains, by analysis of Dr. Gascoyne, 2.64 per cent phosphoric acid, equivalent to 5.76 per cent bone phosphate of lime. 117. (539).
13. Greensand. 118. (540).

Goochland.

32. Gold-bearing quartz; "Fisher" gold mine. 113. (541).
33. Talc, mica, and plumbago; line of Richmond & Alleghany RR. 114. (542).

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17. Iron ore, limonite, from "Cornelia" mine, near Rust siding, S. V. RR.; B. C. Rust, Luray, proprietor. This ore fluxes very easily and is in demand from Pa. blast furnaces. [543].
18. Iron ore, limonite, from "Strickler" mine, near above; same owner. Ore abundant; only 3 feet of covering on it. [547].

Giles.

The following are from the land of C. W. McClaugherty, of Phill P. O., one mile from Wenonah station of New River branch of N. &. W. RR.

3. Red iron ore, regularly stratified bed showing an abundance of it. [544].
4. Clay and a mug made from same; of fine quality for refractory purposes. [545].

Alleghany.

33. Limonite, brown iron ore, lump weighing 625 lbs. and box, from west side of Peters mn. on waters of Dunlap creek, 2½ ms. south from Trice switch of Ches. & Ohio Ry., from mine of Keyser & McAllister, of Backbone, Va., from which some 25 tons are daily shiped to Etna Iron works, Ironton, Ohio. This is probably from Clinton, No. V, formation. The adjoining mine, the "Trice," of the same ore, is worked by C. M. Lawless of Ironton, Ohio, and shiped to that place. [94].

Warwick.

1. Case of bottles of borings from Artesian well, 630 feet deep, sunk by Allen of W. Va. for Chesapeake & Ohio Ry. at Newport News, the seaport terminus of that railway on the great harbor of Hampton Roads. These borings represent the Quaternary and Tertiary beds of Virginia and probably extend into the Jurasso-Cretaceous. Loaned by General Manager C. W. Smith of C. & O. Ry., of Richmond. (553).

Madison.

From the Va. Dept. of Agriculture:

9. Magnetic iron ore, from F. H. Hill, Madison C. H. 119. 120. (554).

Nelson.

From the Va. Dept. of Agriculture:

14. Kaolin, from J. H. Shelton. 121. (555).

15. Ochrous clay from Jas. Miller, Tye river. 142. (556).

Prince William.

From the Va. Dept. of Agriculture:

1. Lean magnetic iron ore. 122. (557).

Fauquier.

From the Va. Dept. of Agriculture:

1. Specular iron ore from Henry Simpers, Delaplane. 123. (558).

2. Clay iron ore, from Henry Simpers, Delaplane. 124. (559).

Orange.

From Va. Dept. of Agriculture:

1 Red iron ore, micaceous, from J. C. Harrison, Barboursville. 125. (560).

2. Red iron ore, from H. C. Baker. 126. (561).

3. Brown iron ore, from Erasmus Taylor, 2 ms. E. from C. H. 127. (562).

4. Slate, from Erasmus Taylor. 128. (563).

Louisa.

From Va. Dept. of Agriculture:

20. Red hematite iron ore, from J. F. Jordan, old Victoria furnace near Tolersville. 129. (564).

21. Micaceous iron ore, from "Davis" mine near Tolersville. 130. (565).

22. Iron ore, from R. M. Kent, Louisa C. H. 131. (566).

23. Gold-bearing quartz, from "Walton" mine. 132. (567).

24. Manganese, from J. B. Jenkins, Victoria furnace. 133. (568).

25. Black-jack iron ore, from J. F. Jordan, Victoria furnace. 134. (569).

26. Graphite. 135. (570).

27, Gold-bearing quartz, said to contain $2,000 to the ton, from J. B. Jenkins, Victoria furnace. 136. (571).

28. Magnetic iron ore. 137. (572).

Fluvanna.

From Va. Dept. of Agriculture:

2. Magnetic iron ores, from L. R. Payne. 138. (573),

Culpeper.

From Va. Dept. of Agriculture:

1. Gold-bearing quartz, from "Culpeper" mine. Maj. C. Knapp. 139. (574).

2. Gold-bearing quartz from' Richardsville, W. B. Love. 140. (575).

3. Gold-bearing quartz from "Ellis" mine. 141. (576).

Clarke.

From Va. Dept. of Agriculture:

6. Kaolin from Carter Shepherd's farm west of Shenandoah river at Castleman's Ferry. 143. (577).

7. Iron ore from Dr. Foster Burchell, 3 ms. south from Berryville. 144. (578).

8. Iron ore from Chas. H. Castleman, west of Shenandoah river, Castleman's Ferry. 145. (579)

9. Iron ore from J. K. Louthan, 2 ms. west of Berryville. 146. (580).

10. Iron ore, magnetic, from Maj. T. L. Humphreys. 147. (581.)

Bath.

From Va. Dept. of Agriculture:

1. Limonite iron ore, No. VII, Oriskany, from Joseph Baxter, Bath Alum Springs. 148. (582).

2. Manganese, from Col. Wm. McClintc 149. (583).

3. Red and brown iron ores from J. C. Harvey. 150. (584).

4. Kaolin. 151. (585).

Rockbridge.

From Va. Dept. of Agriculture:

47. Glass-sand, from Potsdam, near Balcony Falls. 152. (586).

Shenandoah.

From Va. Dept. of Agrieulture:

10. Iron ore from David Neff. 153. (587).

11. Calc-spar from Geo. J. Grandstaff, Edinburgh. 154. (588).

Rockingham.

From Va. Dept. of Agriculture:

11. Ochre, Hamilton's paint, from near Keezletown. 155. (589).

12. Kaolin, from Mrs. John J. Woods. 156. (590).

Henrico.

From Va. Dept. of Agriculture:

6. Greensand marl, from John W. Wariner. 157. (591).

7. Marl, from John W. Wariner. 158. (592).

8. Fire clay, Dill's, 159. (593).

9. Quartz. 160. (635).

10. Clay, from Westham. 161. (594).

Rappahannock.

From Va. Dept. of Agriculture:

1. Travertine marl. 162. (595).

Appomattox.

From Va. Dept, of Agricultre:

2. Margarite, a form of mica, from Geo. P. Harner. 163. (596).

3. Steatite, from Geo. P. Harner. 164. (597).

4. Magnetite, from Geo. P. Harner. 165. (598).

5. Limonite, fibrous, from Wm. Drinkard, Stonewall creek, 3 ms. from James river. 166. (599.)

6. Limonite, brown iron ore, from Thos. J. Stratton, 4 ms. from James river and 6 from N. & W. RR. 167. (600).

7. Gold-bearing quartz from Geo. P. Hume. 168. (601).

8. Specular iron ore, from Geo. P. Hume. 169. (602).

9. Manganese, from J. B. Moon. 170. (603).

10. Specular iron ore, from John J. Goff, Chestnut mn. 171. (604).

11. Limonite iron ore, from E. M. Legrand, Chestnut mn. 172. (605),

12. Limestone, from Mrs. Martha Walker, James river. 173. (706).

Pittsylvania.

From Va. Dept. of Agriculture:

1. Asbestus, from Walker church. 174. (607).

2. Red oxide of iron and manganese, from N. W. Cobb, Callands. 175. (608).

3. Marble, from John L. Hurt. 176. (609).

Buckingham.

From Va. Dept. of Agriculture:

4. Iron ore from Bent creek. 177. (610).

Henry.

From Va Dept. of Agriculture:

1. Garnets, common. 178. (611).

2. Quartz crystals, group of. 179. (612).

3. Garnets in gneiss. 180, (613).

4. Magnetite, from A. N. Price. 181. (614).

5. Tourmaline, from A. N. Price. 182. (615).

6. Mica, sheets of. 183. (616).

7. Quartz crystals, peculiar group. 184. (617).

The Virginias.

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Staunton, Va., December, 1884.

Jed. Hotchkiss, Editor.

Errata.—In the paper of Prof. I. C White, on page 172, several errors occur:

In second column, p. 172, in No. 12 of section, the "dark sandy F. C." should be 6″ to 24″, *not* 6′ 24″ as printed. In No. 15 of same section the "*Coal*, slaty" should be 1′ to 5′, *not* 1′ 5″ as printed. In first column of p. 173, in 5th paragraph, 3rd line, "concealed' should be *decreased*; and in 7th line from bottom of column "to" should be omited.

In second column of p. 173, No. 4 of the section, "black plate" should be "black slate."

The New Orleans Exposition, in an almost complete condition, is now open to the public and thousands, from well-nigh all the states of this and other lands, are now daily thronging its vast structures, the largest the world has ever seen, and admiring and studying the surpassingly wonderful collection of the resources of nature and of human industry there gathered, literally and truly, from all the peoples and countries of the earth.

We had the pleasure of attending the opening exercises of this exposition and of spending a week in a preliminary study of it, and are satisfied that the world has never seen its equal. Would that all the people of these states could go there and spend a week at least—a month would be almost too short a time to see and study it as it should be studied. By the begining of 1885 it will all be in order. Everything that can be done has been done to make it a satisfactory success and to place within the reach of nearly all, even of those in moderate circumstances, an opportunity for seeing with ease and at a moderate cost, what only a small fortune would enable one to see and enjoy under ordinary circumstances. The Southland is there having a grand holiday a half-year long, and we fondly hope that tens of thousands of her children may get there to enjoy it and to learn how much their own land has to show and to be thankful for.

"Leisure Hours Among the Gems," is the title of a handsome volume, of 439 pages, by Augustus C. Hamlin, recently issued by James R. Osgood and Company of Boston, Mass.

This attractive book is devoted to a description of the Diamond, the Emerald, the Opal, and the Sapphire and all the known localities in which these highly esteemed of the "precious stones" are found, and is illustrated by two beautiful colored engravings, one of The Crown of the Empress Anna Ivanovna, of Russia, and the other of A Crystal of Sapphire, natural size, from the Hamlin collection, from Ceylon.

A mere enumeration of the headings of the chapters of this interesting volume on the Diamond gives a good idea of the fullness and completeness with which its author treats of the "shining" things he fondly and graphically describes. These "headings" are: 1st. The Diamond as a Mineral; 2nd. Antiquity of the Diamond as a Gem; 3rd. Diamond Localities; 4th. Origin of the Diamond; 5th. Physical properties, etc.. of the Diamond; 6th. The Turkish Casket and Ancient Gems; 7th. The Russian Regalia; 9th. The Regalia and other Gems of England; 10th. Asiatic Gems; 11th. Miscellaneous, or other Diamonds; 12th. Cuting of the Diamond; 13th. Testing of the Diamond; and 14th. Value of the Diamond.

The Virginia Diamond is mentioned in this wise: Speaking of the only diamond known to have been found in Western Europe the author argues that it was found "in place," adding, "This instance is no more strange than the finding of the great American diamond in Virginia, which was also a soltaire and many miles below the auriferous fields whence it is supposed to have drifted." (p. 47).

"The gold fields of the Southern States of North America have been known to be diamond-bearing for forty years or more, but as yet no earnest or well directed search has been made for the gems. During this period of time more than thirty diamonds have been picked up by accident along the gold belt which extends from the central and eastern portion of Alabama, through Georgia, North and South Carolina, even to the interior of Virginia. All along this auriferous formation the itacolumite appears in the gravel beds or in ledges or even in large mountains in some localities." (p. 48).

"The largest diamond thus far found in the United States and preserved was picked up in 1856 on the banks of the James river, opposite the city of Richmond in Virginia. The spring floods had probably washed it down from the gold fields which are situated a few miles above. The stone was a well-defined octahedral crystal. Its weight, while in the rough state, was about 25 karats, and its color was of a faint greenish white tinge. Its transparency was perfect, but its refractions were somewhat impaired by a flaw or a speck in the interior. The American diamond-cuting establishment of Morse, Crosby & Foss, of Boston, cut this gem very successfully at the cost of about $1,300. The stone was purchased by a distinguished American athlete in New York, and worn by him in a breast-pin for many years."

"None of these Southern diamond fields have been examined systematically by experienced miners with a view to their development, and in fact no definite idea of their limit or their value can be given. But we have the impression that they are far more extensive than has been imagined by mineralogists. The returning gem-seekers who have been educated in the diamond mines of South Africa may investigate ere long these unknown districts and settle the question beyond further inquiry." (p. 50).

We have only space to add that in its treatment of the *Sapphire* this instructive volume states that this gem, generally of undecided colors, as in the form usually called corundum, is found in the granular limestones of New Jersey, in the mica-like ripidolite of North Carolina, the granites of Siberia, and the dolomite limestones of Russia; and that the corundum belt of the United States has been traced from Philadelphia to Georgia.

We have read this work with great pleasure and feel obliged to the author for having given ourselves and the public the benefit of his "Leisure Hours Among the Gems."

S. W. Va. Minerals.—We find the following interesting item in "The Courier" of Bristol, Tennessee:

Gen. Imboden having been requested by Maj. Jed. Hotchkiss, the Asst. U. S. Com'r for Virginia at the New Orleans Exposition, to aid in geting the representative samples of the minerals of Scott, Lee, Wise, Dickenson and Buchanan counties, and of the lower end of Washington, and to that end having only $50 put at his disposal by the Com'r., laid the matter before the Va. Coal & Iron Co., and appealed to it for $100 additional.—Mr. Kemmerer, the Sec'y and Treas. replied by wire to go ahead.—The result has been the collection of about one ton of splendid samples of the Bituminous, Splint and Cannel coals of the great Cumberland mountain deposit; of the fossil ores and hematites between here and the Kentucky line; of the marbles of Scott, and of the building- and grind-stones of Washington county on the line of the S. A. & O. RR., whenever it is built.

The samples are all very fine, but the marble is extraordinary and cannot fail to attract universal attention at New Orleans.—There are now five large blocks at Chapman's marble works in this place, that have been polished perfectly on one face, and partly wrought on the others, that surpass anything, Mr. Chapman and his workman say, that ever came under their hands in a long course of business. It is impossible to describe them. They are all different, but found in a ledge 300 feet thick and 4 to 5 miles long, from Estillville westward. The general gives them the fancy names of "Black Walnut," Old Oak," "Dappled Gray," "Cherry Spoted," and "White Pebbled" marbles, as being most expressive of their several shades of coloring, and peculiar arrangement of particles—and really, some of them look like *precious* stones, they are so beautiful and so unlike all other *marbles* on the market. They are simply *superb*, and as it will be several days before they will be boxed, we advise our townsmen, and the ladies especially, to call at Chapman's marble works and see them. Evidently a huge business will be done in these quarries when we get a railroad to them.

We understand W. W. James, Esq., will add handsomely to this coal and ore exhibit from his Powell Mountain lands in Scott Co., Va.

Pocahontas, Va., Coal output, Nov., 1884.—President H Wickham of the South-west Virginia Improvement Co., Roanoke, Va., sends *The Virginias* the data for the following statement of the output of the coal mines and coke ovens of his company, at Pocahontas, during the month of November, 1884, in 2000 lbs. tons. To this we add, from page 171, the previous output of the year and so give, in the second column, the total output of coal and coke, by this company, from Jan. 1, to Dec. 1, 1884,

	Nov.	Jan.-Nov.
Coal mined	37,274	255,223
Coal shiped	25,614	165,649
Coal coked	10,632	89,780
Coke made	6,697	. . .
Coke shiped	7,162	. . .

This November output is a gain of about 4 per cent on the October output. The 255,223 tons mined. of the above columns, represents the output of 9 months.

Elsewhere in this issue will be found some new analyses of this now noted coal and some notes in reference to marketing it.

The South-west Va. Co. makes a fine display of its coal and coke in department No IV of the Virginia exhibit of the New Orleans exposition; on a platform at the south-western end of the cases of Virginia's Apalachian minerals is a half-pyramid pile of the lump coal of the Pocahontas mine and the coke made from it, while close at hand, placed against one of the lofty pillars of the great building is a complete section, 12 feet high, of the "Big" or No. 3 coal bed from the Pocahontas mine.

Notes on the Geology of West Virginia.

By I. C. White.

The Upper Potomac Coal Field in the vicinity of Fairfax Stone.

During the last May excursion from the West Virginia University, our party encamped two days at Fairfax summit, with Mr. Wm. E. Porter, general superintendent of the W. Va. Central & Pittsburg RR. While stoping at this point, an opportunity for studying the coals of that field was presented under the guidance of Mr. Riordan, ex-state mine inspector of Maryland, who made all the openings in the several coal beds there, and to whom we are indebted for much aid in the hasty examination that was undertaken.

Fairfax is a station on the line of the W.Va. C. & P. RR., 45 miles from Piedmont, and exactly on the summit of that great divide which separates the waters of the North Potomac river from those of Cheat river. The point is only a few hundred yards from the celebrated stone, set up by the commissioners that located the S. W. boundary of the lands of Lord Fairfax, which now marks the southwestern corner of Maryland.

The grade of the railroad at Fairfax summit is 3,057′ A. T., the highest elevation yet attained by any railway east from the Mississippi river, since it is situated near the central line of the Alleghany mountain plateau in the region of its grandest development.

A geologist in crossing the Alleghanies along the line of the Baltimore & Ohio RR., will observe that they are made up of three grand arches, (leaving out Laurel and Chestnut ridges at the west and the minor crumples on the sides of the great folds), the structure of which is roughly as follows, along a line at right angles to the strike, begining at cut No. 80, seven miles west from Rowlesburg, and ending at the Eastern Front Ridge of the Alleghanies.

The most western of the arches shown in the above diagram* has its crest near Terra Alta (formerly Cranberry summit) where the upper members of the *Chemung beds* are brought to the surface, at an elevation of 2,500′ A. T., while the western slope of the arch ends in the *Barren Coal measures*, No. XIV, at Cut No. 80, ten miles to the north-west.

The syncline next east from the Terra Alta axis catches the *Pottsville conglomerate*, No XII, and the basal portion of No. XIII in the crests of the mountains, and although the B. & O. RR. runs for nearly ten miles along the eastern slope of the Terra Alta arch before crossing this syncline, yet the actual length of the slope is only about five miles when measured at right angles to the strike.

The crest of the second great arch crosses the B. & O.RR. nearly through the centre of Mountain Lake Park, about five miles southeast from the Oakland syncline. It is greater than the Terra Alta uplift, since the *basal members* of the *Chemung beds* are brought to the surface in the very tops of the mountains 3,000 feet above the sea. The southeastern slope of the Mountain Lake Park axis is long, and when we come to its base, on the North Potomac river at Piedmont, we find that great syncline embracing rocks nearly up to the top of the Upper Coal measures, No. XV.

Back-bone Mountain of the Alleghanies is made by the outcrop of No. XII conglomerate, where it passes into the air on the southeast slope of the Mountain Lake Park arch. The B & O. RR. crosses the Back-bone mountain at Altamont, and from this point it forms a long line of blue as far south as vision is possible. This Back-bone mountain forms the

*This diagram will appear hereafter. The absence of the Editor prevented its preparation for this issue.

northern rim of the Upper Potomac coal field, and at Fairfax its summit is between four and five miles distant.

The southern rim of the Upper Potomac coal field is formed by the same great mountain maker, the conglomerate of XII and its companion No. X, where they pass into the air again in the Eastern Front Ridge on the western slope of the third and last grand arch of the Alleghany range, the Keyser axis. The B. & O. RR. emerges from this mountain through the gap of the North Potomac, three miles below Piedmont.

The North Potomac river takes its rise only a few yards distant from Fairfax Stone and with many windings follows down this great syncline just described to Piedmont.

The Pittsburg coal, or "Big vein" of Elk Garden, once covered all the region between the two rims (Back-bone and Eastern Front Ridge) of this wide basin, but the North Potomac, Stony river, and their numerous tributaries have, in the course of long ages of erosion, removed it all except two or three isolated patches covering only a few acres each, which yet remain to attest the once wide expanse of the *Pittsburg bed*. The identification of the *Pittsburg coal* in the summits of two knobs at Fairfax constitutes one of the most interesting features of our work, for there is no other outcrop of this coal nearer than Elk Garden, 30 miles distant.

The area of the *Pittsburg coal* that has thus been lost by erosion from the basin included between Back-bone mountain and the Eastern Front Ridge, is enormous, for the distance from Piedmont to Fairfax is 45 miles, and the breadth of the basin from one mountain rim to the other is from 15 to 20 miles. But the same course of reasoning which assures the geologist that the *Pittsburg bed* once covered all of this great basin, renders it equally certain that this coal bed formerly stretched in a vast sheet westward across the grand arches of the Alleghanies until it connected with the present outcrop of that bed along their western slopes. Some idea of the amount of erosion from the Alleghanies may be gained when it is stated that if we could restore the rocks that have been swept off from the Mountain Lake Park arch, the Pittsburg coal would be found there at the height of more than 7,000 feet above the present surface, or, say at 10,000 feet above the sea, and yet this estimate includes none of the 10,000 feet of rocks, or more, still above the Pittsburg coal, that have disappeared from the crest of the same arch.

I have spoken of all the region lying between the Back-bone and Eastern Front Ridge mountains as constituting only one syncline or basin, and while this is strictly true in a broad sense, yet when we come down to details it is not, for several minor axes occur inside of the main basin, but they are so obviously mere crumples on the sides and bottom of the one great trough, that in giving a general outline of the structure they would rightly be neglected, since such folds and wrinkles are found between any two great arches whose crests are several miles apart.

The disposition and strength of these minor folds at the two localities (Piedmont and Fairfax) exercise a marked effect, however, upon the area of the coal between the two great arches, for at Piedmont this area is only three to four miles broad, while in the Upper Potomac region the coal area is fifteen to twenty miles in breadth, though of course erosion has been a large factor in creating this difference.

The foregoing description of the Alleghany mountain geological structure in W. Va., has been given in this connection, since nothing accessible to the general reader has been written upon the subject, and without it, the relative geological position of the Upper Potomac coal field could not be well understood.

To any one who wishes to see a primeval forest in all its unbroken wildness, we would commend a ride over the W. Va. C. & P RR. from Piedmont to Davis, its present terminus. The RR. starts out in the upper half of No. XII, and following the immediate banks of the North Potomac, keeps at about the same geological horizon for 20 miles or more, when the course of the river veers eastward, and exposing all of No. XII soon cuts down into the *red beds* and *shales* of No. XI, which may be seen in the vicinity of Elkins; but from this point on up the stream its course meanders back toward the central portion of the basin and Nos. XI and XII pass gradually under the river while the shales and soft rocks of No. XIII come down and form the surface rocks and soils.

The scenery along the lower portion of the Potomac's course, where it is flowing in the conglomerate, is quite wild and picturesque, and to the lover of such will well repay the journey; but when we enter the area of the Coal measures, Nos. XIII and XIV, above Elkins, the cliffs and rugged heights disappear, and we come into a gently rolling country whose actual outline can scarcely be determined, so dense is the forest growth. For miles upon miles the RR. passes through this forest region where scarcely a single tree had been felled by human agency before the RR. entered it, and where yet only the vista of the RR's. course and an occasional lumberman's camp relieve the dreary monotony of the seemingly interminable jungle.

Here on this elevated plateau, we reach a zone of temperature and moisture (for I am credibly informed it rains or snows 60 to 75 days out of every 100) in which the evergreen hemlock and pine attain a luxuriance seldom equaled elsewhere in the country. These, together with other trees standing as thickly as nature will permit, with many prostrate, and over them rising a mated growth of laurel, all conspire to make up a picture which must be seen to be appreciated.

It is into such a wilderness as this, roadless and pathless, that Mr. Riordan penetrated, and where everything was covered with a deep accumulation of soil and other surface debris, was able, with an acumen almost instinctive, though founded on practical observation, to lay bare the wealth of coal which had there lain concealed for ages.

Two knobs rise to 150'-200' above the general elevation of the RR. summit in the immediate vicinity of Fairfax station, one north, the other south from the line of the RR.

The northern one is known as Fairfax Knob, and in descending from its summit the following section was constructed from the openings in coal beds and other exposures made by Mr. Riordan:

1.	Concealed from top of knob	50'
2.	*Coal*, soft, good	10'
3.	Fireclay and shales	15'
4.	*Coal*, good	5' 6"
5.	Shales, fireclay and concealed	15'-50'
6.	Coal, with columnar structure, called the "coking coal," has a shale 8"-12" in bottom portion	7'
7.	Concealed	25'
8.	Coal, { coal .....2', rock .....1', coal .....2' }	5'
9.	Concealed and sandstone	70'
10.	*Coal*	1' 3"
11.	Concealed	25'
12.	*Coal*	1' 8"

I was greatly puzzled when first shown the three large beds of coal, Nos. 2, 4, and 6 of this section, opened one above the other, where the rocks are nearly horizontal, and therefore cuting off all chance of duplication. The puzzle was to determine in what part of the series they belonged, since everything is covered up for several miles in either direction, and the streams do not cut down any lower than No. 12 of the section. It was not until the following day,

when I had identified the *Upper Freeport coal*, in an opening several miles distant, and determined from the pitch of the rocks that it must underlie Fairfax Knob at a depth of 400′-500′ feet, that I could do anything toward solving the problem of identity in the coals of Fairfax Knob. The place of the Upper Freeport coal having been thus fixed, the only conclusion left, was that these beds, Nos. 2, 4 and 6, represent the great *Pittsburg coal*, here split up into three divisions by the thickening up of parting slates. Although so much coal is exhibited in this section its commercial value is limited, since, occuring as these beds do, only in two isolated knobs, the area is so small that when we make the necessary allowance for poor coal on the outcrop, the remaining area in all except the lowest, or bed No. 6, is so limited that these coals may practically be neglected in any estimate of the value of the Upper Potomac coal field.

There is a possibility that No. 2 may be the *Sewickley bed* with the 110′ of rocks which intervene between it and the *Pittsburg coal* at Elk Garden, thined down to 15′ here; but this I regard as in the highest degree improbable.

The other knob in which these coals are found is known as Roger Camp hill, and lies just south from the RR. In descending it the following succession was observed and compiled from Riordan's notes:

1. Concealed from top of knob . . . . . 10′
2. Coal, visible (same as No. 2 in preceding sec.) . 2½′
3. Shales and concealed . . . . . 10′
4. *Coal* . . . . . 7′
5. Shales and fireclay with 15″ of coal near base . . 12′
6. Coal, "coking bed" { coal, good 4′ 2″; clay, . . 0′ 8″; coal, . . 0′10″ } . . . 5′ 8″
7. Concealed . . . . . 25′
8. Coal { coal 1′; slate 1′; coal 2′ } . . . . . 4′
9. Concealed . . . . . 60′
10. Coal with a thin slate near middle . . . . . 3′ 6″
11. Concealed to level of Fairfax station grade (3,055′ A. T.) . . . . . 40′

Here we get practically the same section as that shown on Fairfax Knob, except that the uppermost bed of coal lies so near the surface that it could not be fully exposed. The area of coal in this knob, as in the one north of the RR., is very limited, and Mr. Riordan informs me that there are no other localities in the Upper Potomac field where these beds of coal are to be found, having been worn away by erosion from everywhere else in the basin.

The Glade fork of Blackwater river, a tributary of the Cheat, starts from Fairfax summit and flowing southwestward, finally cuts through the Barren measures (No. XIV) and exposes the upper members of the Lower Coals about five miles from Fairfax.

The Upper Freeport coal, known everywhere throughout the Upper Potomac-Cheat country as the "8 foot vein," has here been opened on the bluff of the Glade fork by Mr. Riordan, where it shows the following structure:

1. Black slate . . . . . .
2. Coal, { coal . . . . . 4′ 3″; dark slate and bone coal 1″-12″; coal . . . . . 3′ 6″ } . 8′

The lower portion is a bright, rich, coking coal, while the upper half or that above the slate is better adapted for steam purposes. Mr. Riordan informs me that he has opened this coal in more than a dozen localities in this coal field, from the southern slope of Back-bone mountain where it passes into the air, across to the Eastern Front Ridge, where it in turn shoots up to the south, also on Stony river, and that at all these localities it exhibits a thickness never less than 7 feet, and usually 8 feet. It underlies many thousand acres in this coal field, and hence will prove of great value in the future. The dip is pretty strong to the northeast at the opening, and would carry this bed several hundred feet below the surface at Fairfax summit.

About two miles further down Glade fork it cuts through the *Lower Coal measures* to the top of No. XII conglomerate, and there Mr. Riordan has opened two other coal beds in No. XIII which are shown in the following section, made on the left bank of Glade fork:

1. Concealed with a massive conglomeritic sandstone, (Mahoning) . . . . . 100′
2. *Coal, Upper Freeport* ("8 foot bed") . . . . . 8′
3. Concealed with much massive sandstone (Freeport) 170′
4. Coal, Lower Kittanning "11 foot vein" { coal, soft . 1′ 8″; slate . . . 2½″; coal . . . 1′ 4; slate . . . 0′ 2″; coal . . . 4′ 0″; gray shale . 1′ 3″; coal . . . 3′ 0″ } . . 11′ 7½″
5. Concealed with much sandstone . . . . . 75′
6. *Coal, Clarion*, soft, clean . . . 3′
7. Concealed and sandstone to level of Glade fork . 40′
8. Top of No. XII conglomerate in bed of stream .

No. 4 is known here as the "New Dobbin House," or "11 foot vein," and from its relations as given in the section, proves beyond doubt to be one of the *Kittanning beds* of the Pennsylvania series, and in all probability the Lower one. It is, as will be seen, a composite bed, having a structure very much like the same coal in the shaft at Newburg, Preston co., and also at Campbell creek, Coalburg, and Ansted, where this bed is mined on the Kanawha river.

The opening in this coal had partially fallen in when I visited the locality, hence the details of its structure were given me by Mr. Riordan, who discovered the coal here and made the original opening. The same gentleman also informs me that the *Clarion coal*, No. 6, is very clean and pure and would probably be a good coking coal.

The top of the *Pottsville* or *No. XII conglomerate* is seen in the bed of Glade fork, where our section ends, and a short distance below the stream begins to cut through it in a series of splendid cascades.

The *Lower Kittanning coal*, of course underlies practically all of the Cheat-Potomac coal field, and will certainly furnish a vast amount of valuable fuel, and probably prove an excelent gas coal; but the area of the *Upper Freeport bed* at the top of the section is so great that the *Kittanning* is likely to remain untouched for many years.

The thickness of the *Lower Coal Measures*, No. XIII, foot up a little more than 300′ in the above section, as compared with 268′ at Piedmont, and 346′ at Elk Garden.

The Va. Midland Ry. at New Orleans.—As part of the Danville system, this railway has made a fine collection of ores and other minerals from the country tributary to its lines for exhibition at New Orleans. Mr. Wm. G. Douglas, of Catletts, Va., who has made this collection and who will have charge of it, writes us that this exhibit will contain iron ores, glass sands, clays, copper and other ores, building stones, etc., etc., from Shenandoah, Warren, Fauquier, Prince William, Culpeper, Orange, Albemarle, Nelson, Campbell, Pittsylvania and Franklin counties. Mr. Douglas will make a liberal contribution from his special collection to the Virginia state exhibit. Elsewhere we publish a full list of this exhibit.

New Analysis of Flat-top Coals.—Castner & Co., enterprising commission coal dealers in Philadelphia and New York, have recently taken in hand the sale of Flat-top Va., coals from the Pocahontas mines of the Southwest Virginia Improvement Company, all along the Eastern seaboard, and are meeting with great success, "the coal giving almost general satisfaction," a well informed correspondent informs us. New Analyses of samples of these high-grade semi-bituminous coals have recently been made, in the cities where they are being marketed, by prominent analysts, as follows:

	No. 1.	No. 2.	No 3.	No. 4.
Carbon	77.89	76.95	74.20	75.22
Volatile matter	17.93	19.24	23.90	18.48
Sulphur	0.49	0.71	0.52	0.28
Moisture	0.70	0.45	0.52	0.62
Ash.....	2.99	2.65	1.38	5.68

No. 1 was made by Prof. F. A. Terry, of Boston, Mass.; No. 2 by the chemist of the Norway Iron & Steel Co. of Boston, Mass., a very large consumer of coal; No. 3 by Prof. Chandler, of the Columbia College School of Mines, New York, N. Y.; and No 4 by Prof. Genth, of the University of Pennsylvania, Philadelphia, Pa.—The sample analyzed by Prof. Genth must have contained some foreign matter, as his percentage of "ash" is much greater than in any of the numerous analyses of these coals that have heretofore been made by the best analysts of the country.

We learn that Castner & Co., in a spirit of laudable enterprise, propose to send agents for the sale of Flat-top coals not only to all along our Southern coast and to the West Indies and South America, as well as to push sales in New England, but also to send to Old England as well, and enter into competition, "duty free" of course, with the high-priced English coals that are consumed by the million tons in the great seaport cities of that country.—*The Virginias* has always insisted that the world can furnish no better coals for steam, domestic, and other fuel purposes than those of our No. XII, or Lowest Coal Measures, coals that are peculiar to the Flat-top and New River regions of Virginia and West Virginia, and in this as in many other things, (such as the cheap manufacture of iron in Virginia) it confidently awaits the near-coming time when nearly all others will agree with it.

Report of West Virginia Mine Inspector.—In a recent issue of the "Wheeling Register" we find the following abstract of the forthcoming report of Mine Inspector O. A. Veazey, for 1883: "This is the initial report of this state officer, the office having been created by the last session of the legislature. It is a volume of over 100 pages, including the tables, and altogether appears to be a very exhaustive report on the subject of mines and miners, with all that pertains to them in any way. Among other things it includes an examination of and a report on the condition of every mine in the state; as, for instance, the imperfections, if any; the safety of the walls and ceilings; the condition of the drainage; casualties; output, etc., etc.

That the public may have some idea of the work to be done by an Inspector of Mines for the state of West Virginia, as the law now stands, I submit the following:

1st. There are 100 mines in which 15 or more persons are engaged as miners," consequently these mines must be "inspected once a year of oftener if necessary."

2d. The inspector must be furnished an accurate map of each of these mines, showing the progress of said mines to the first days of January and July of each year. If such maps are not furnished by the operators of the mines, it is the duty of the inspector to make such maps or have them made, and if the operator refuses to pay for the same, the inspector has then to sue the operator for the amount of his bill for making or having such maps made.

3d. After inspecting a mine, and then carefully studying the maps of it, the inspector must give written instructions to the operator as to what is necessary to be done in order to remedy any defects that may have been found in the ventilation, drainage, or safety of said mine.

4th. The operator having been given a reasonable time in which to comply with the instructions of the inspector, he must again visit the mine to see whether or not his instructions have been complied with.

5th. If the inspector finds that his instructious have not been complied with, or that the mine is not well ventilated, or well drained or that there are any dangerous pieces of roof on the entries that are not securely proped, or that there is not "kept at or near the entrance to the mine, a sufficient amount of timber of the proper size and kind, to be placed therein whenever it may be necessary to secure any loose rock or coal overhead, in any part of said mine, which may be in use, so as to prevent injury to the persons working therein," then the inspector must go before the grand jury of the next circuit court of the county in which the mine is situated, and indict the operator of such mine for violation on any or all the above points of which he may be culpable.

I shall not in this report, make any suggestions as to the proper legislation relating to the mines" of West Virginia, but will submit to your Excellency a special report on that subject in time for the same to be embodied in your message to the next Legislature.

Statistical.

Total coal production of the state as per reports and estimated quantities, for 118 mines	2,805,566
Total quantities shiped out of the state.....	1,981,277
Quantity of coal used inside the state by manufactories of all kinds	323,270
Total quantity of coal used inside the state.....	592,001
Quantity of coal coked.....	278,535
Quantity of coke produced.....	170,437
Quantity of coke used in the state.....	41,016
Quantity of coke shiped out of the state.....	127,421
Total number of employes in and about the mines	6,394
Number mules and horses in and about the mines.	749
Number of casualties in and about the mines.....	51
Number of fatal casualties in the mines.....	19

The unit of measure used in the above figures is the "long" ton, weighing 2240 pounds avoirdupois.

Virginia Iron-mining Notes.

Capt. F. J. Chapman is filling an order from Victoria furnace for 1,000 tons of ore from the beds of No. III ore that he operates along the southern slope of Purgatory mountain, near Buchanan, Botetourt county. This ore, which is of a fine quality and works kindly in the furnace, is sent to Victoria over the Richmond & Alleghany and the Chesapeake & Ohio railways via Clifton Forge.

The Rorer Iron Co., through its superintendent, J. H. Bramwell, has recently sold from its "Gale" mine, south of Roanoke, 5,000 tons of iron ore to the Lynchburg Iron Co. for use in its furnace at Lynchburg, to be shiped over the Norfolk & Western RR., and 5,000 tons to the Crozer Iron & Steel Co., for use in its furnace at Roanoke. Tests made of this ore in both these furnaces have been very satisfactory.

Northumberland.

1. Meiocene marl from farm of Levi H. Gulick, Northumberland C. H. Va. Agr. dept. 2. (427).

Gloucester.

1. Fossil shell with quartz incrustation, from Gloucester Point. Va. Agr. dept. 1. (426).

King William.

1. Marls and fossils from Dr. Croxton's. Va. Agr. dept. 7. (431).

Lunenburg.

1. Glass sand, from R. H. Hatchett's, Wattsboro. Va. Agr. dept. 8. (432).
2. Quartz and pyrite, from Mr. Golding's. Va. Agr. dept. 9. (433).

New Kent.

1. Phosphate rock from R. H. Lacy's, "Mt. Pisgah;" contains, by analysis of Dr. W. J. Gascoyne, chemist of Va. Agr. dept. 23.20 per cent phosphoric acid; equal to Bone phosphate of lime 50.65. Va. Agr. dept. 10. (433).
2. Iron ore. Va. Agr. dept. 11. (434).
3. Greensand marl from J. P. Pearson's, Tunstall. Va. Agr. dept. 12. (435).
4. Shell marl, from Tunstall. Va. Agr. dept. 13. (436).
5. Shell marl, from St. Peter's church. Va. Agr. dept. 14. (437).

York.

1. Pectens; scallop shells, bank of York river. Va. Agr. dept. 5. (429).
2. Marls, fossils, shells, coral, Tertiary limestone cut into millstone, from bluffs of York river near Yorktown. Va. Agr. dept. 15. (438).

Brunswick.

1. Granite. Va. Agr. dept. 16. (439).

Isle of Wight.

1. Yellow marl from Stephen H. Urquhart's. Va. Agr. dept. 17. (440).

Surry.

1. Yellow marl from Blair Pegram's. Va. Agr. dept. 18. (441).

Bedford.

The following are from the collection of the Va. Dept. of Agriculture.

3. Kyanite, from J. A. Davis. 44. (467).
4. Hematite iron ore; Bedford Iron Co. 45. (468).
5. Red hematite; Bedford Iron Co. 46. (469).
6. Zinc ore; calamine; J. A. Davis. 47. (470).
7. Magnetic iron ore; J. A. Davis. 48. (471).
8. Flint; J. A. Davis. 49. (472).
9. Pyritous mica slate· J. A. Davis. 50. (473).
10. Conglomerate. 51. (474).
11. Hornblende crystals in quartz. 52. (475).
12. Pyrite in quartz; Graves'. 53. (476).
13. Salts deposited from aluminous shales; N. B. Updyke. 54. (477).
14. Aluminous shales from which above effloresced; N. B. Updyke. 55. (478).
15. Quartz, crystals. 56. (479).
16. Pyrite, etc.; J. W. Murrell. 57. (480).
17. Magnetic iron ore; from Goose creek. 58. (481).
18. Hornblende gneiss. 59. (482).

Carroll.

The following are from the Va. Dept. of Agriculture.

12. Iron ore, hematite. 22. (445).
13. Iron ore, Limonite from Martin Dalton. 24. (446).
14. Lead ore, from Martin Dalton. 25. (447).
15. Iron ore, from Martin Dalton. 26. (448).
16. Gneiss, from Ira J. McGrady. 27. (449).
17. Mica slate, from I. J. McGrady. 28. (450).
18. Iron ore, from Martin Dalton. 29. (451).

Patrick.

The following are from the Va. Dept. of Agriculture.

1. Hornblende. 30. (453).
2. Magnetic iron ore from Judge Lybrook's. 31. (454).
3. Copper ore, low grade. 32. (455).
4. Steatite. 33. (456).
5. Mica. 34. (457).
6. Limonite. 35. (458).

Bland.

The following are from the Va. Dept of Agriculture.

15. Chert in limestone in form of moccason. 36. (459).
16. Ochre and iron ore, from Iron mn. 37. (460).
17. Iron ore, red, from Round mn. 38. (461).
18. Tufaceous marl, deposit from water. 39. (462).
19. Lead and zinc ores. 40. (463).
20. Manganese. 41. (464).
21. Barytes on limestone. 42. (465).
22. Feldspar. 43. (466).

Fairfax.

The following are from the Va. Dept. of Agriculture.

1. Soapstone; Edward Fitzhugh. 79. (502).
2. Iron ore; J. J. Ratchford, Vienna. 80. (503).
3. Potter's clay; Edward Fitzhugh. 81. (504).
4. Coal, Jura-Trias; 82. (505).
5. Lignite, Jura-Trias; Vienna. 83. (506).
6. Mica schist. 84. (507).
7. Kaolin, Edward Fitzhugh. 85. (508).

Spotsylvania.

The following are from the Va. Dept. of Agriculture.

1. Iron ore. 86. (509).
3. Decomposed pyrite. 87. (510).

Chesterfield.

The following is from the Va. Dept. of Agriculture.

8. Granite, from Old Dominion Granite Co's quarries on James river. 88. (511).

Loudoun.

The following is from the Va. Dept of Agriculture.

17. Copper ore; James Pinkham. 89. (512).

Cumberland.

The following are from the Va. Dept. of Agriculture:

1. Iron ore, lean; Lyon A. Agee. 89. (513).
2. Iron ore; Dr. J. M. Blanton. 90. (514).
3. Magnetite; Col. J. E. Wood, near Ca Ira. 91. (515).
4. Lignite; Dr. J. M. Blanton. 92. (516).

Coal and Coke Traffic of Ches. & Ohio Ry., Oct., 1884.

General Manager C. W. Smith sends *The Virginias* the data for the following statement of the total output and distribution of coal and coke received from mines on line of C. & O. Ry., (including fuel on Lexington division) during October, 1884, and October, 1883, in tons of 2,000 lbs., compiled by fuel agent, J. W. Hopkins :

Kind.	1884.	1883.	Increase.	Decrease.
Cannel	2,412	109	2,303	.....
Gas	21,002	30,129	.....	9,127
Splint and block	16,118	10,415	5,703	.....
New River, &c	20,085	30,385	....	10,300
Coke	9,543	9,023	520	.....
Totals	69,160	80,061	8,526	10,427

The distribution of the above was as follows :

	1884.	1883.
1. To Ches. & Ohio Co. for its own use	16,980	18,534
2. To Huntington, for West via. Ohio river	914	.....
3. On Elizabethtown, L. & B. S. and K. C. RRs	11,702	6,110
4. On Ches. & Ohio RR., excepting Richmond	6,358	17,853
5. To Rich. & Alleghany RR. at Clifton Forge	2,300	1,407
6. To Valley RR. of Baltimore & Ohio at Staunton,	....	.....
7. To Shenandoah Valley RR. at Waynesboro	54	75
8. To Va. Midland at Charlottesville	2,837	7,759
9. To Rich. Fred. & Potomac RR., at Junction	984	729
10. To Richm'd for consumption, includ'g tugs, &c,	7,634	10,926
11. To James River wharves for shipment	5,459	....
12 To Newport News, For consumption, &c	563	639
12 To Newport News, For shipment	13,375	16,029
Totals	69,160	80,061

The movement from January 1st, 1884, to Oct., 31st, 1884, inclusive, and for same time in 1883, was as follows :

	1884.	1883.	Increase.	Decrease.
Cannel	18,890	20,623	.....	1,733
Gas	253,571	303,289	.....	49,718
Splint and Block	94,240	86,085	8,155	.....
New River, &c	324,273	331,390	.....	7,117
Coke	61,345	86,857	.....	25,512
Total	752,319	828,244	8,155	84,080

Woodbourne; *a Novel of the Revolutionary Period in Virginia and Maryland. In two parts. By Col. Joseph Mayo.*

Our friend, the author of this handsome volume, in his most excelent preface, states that "The scene is mainly confined to the little spot of 'that Land within the Capes', which its first explorer, 'Captaine John Smith' of famous memory, has described as bearing the first prerogative over the most pleasant places known."

After modestly stating his aims he enters a vigorous protest against Thackeray's portraits as such, of the Virginians, given in his novel of the same name, in being as unreal as the ideal "Old Dominion" of his imagination. He requests mankind—and as a matter of course the better portion of that kind known as woman-kind—not to accept the *traditional* type of the Virginia cavalier as merely a gaming, carousing, fox-hunting, ever-fighting squire, with occasional whisperings of vapid sentiment into beauty's ear.—In both these protests versus grievous and long-standing grievances we heartily concur.

The whole plot of the story we may not give, lest we spoil its zest, but we can heartily commend its graceful humor and pure morality to our readers on their own behalf.—Would that there were more such "novels" to feed the ever unsatisfied desire of humanity for "novelties" to devour.

Begining with a scene in Scotland—that prolific land from which, many writers to the contrary notwithstanding, so large a portion of the best stock of Virginians has sprung—after the return of those that were "Out in the '45," it shifts to the shores of the Potomac, then back and forth from the "Old world" to the "New," just as the slow-moving craft of the old days kept up quarter-yearly relations between these widely separated but closely related continents.

The plot is centered in but few persons. The introduction of "Charles Carroll, of Carrollton" in a learned discussion with Father Soule', on the government of the then infant colonies and the approaching Revolution, lend dignity and increased interest to the work ; so also does the appearance of Waddell, the famous "Blind Preacher," and the evanescent excitement over his preaching.

There are two items which take captive our fancy: The description of an old library must surely have been a reality to our author's eyes and heart; and the other, a catalogue of a boy's knowledge and accomplishments, which is a complete schedule of its kind.

The binding of this Virginia volume, the product of famous old Westmoreland, is very tasteful, the letter-press clean and distinct, and Col. Mayo is to be congratulated for the freedom from typographical errors and for the graceful seting given him by his publishers, The Baltimore Publishing Co., Baltimore, Md., to whom we are indebted for this volume.

The W. Va. Central & Pittsburg RR, Co. recently held a meeting in Baltimore, to which city its principal office has been removed, from New York, and put in charge of W. S. Moore, who has heretofore been Manager of its coal department, as secretary. The president, Hon. Henry G. Davis, says the "Sun," made a statement as to the condition of the company up to Nov. 1, which met the expectations of the board. Track-laying was completed Nov. 1 to Davis, at the junction of the Beaver and Blackwater rivers, in Tucker county, 57½ miles from Piedmont. There has been a large increase in the coal tonnage from the Elk Garden mines of the company.

The W. Va. C. RR. Co. with its notable board of directors, is an enterprise in which Messrs. Henry G. Davis, Mr. S. B. Elkins, and Major Alexander Shaw were the principal capitalists at its inauguration, some four or five years ago. They subscribed for several millions of the capital stock. Mr. Davis, who was then in the U. S. Senate, knew the project was a most promising one, and as one of the promoters said at the time he thought it afforded his political friends a good opportunity to go into an investment that would be more profitable than politics. Mr. Blaine, the friend of Mr. Elkins, it was stated, put $20,000 into the company. Senator Gorman, a friend of Mr. Davis, put in something less than Mr. Blaine. Senator Bayard, Mr. Barnum, Mr. Schell and Hon. Wm. Pinkney Whyte also took interests in it.

The paper of Prof. I. C. White of the U. S. Geol. Survey, that we printed in our Nov. number, gives much valuable information concerning the geology of a portion of the right royal domain belonging to this company.

The Louisville Exposition, recently closed, awarded a diploma and a medal to the Chesapeake & Ohio Ry. for its grand exhibit of minerals and timber from along its lines, as it did in 1883. Few roads can make such a showing of mineral and forestal resources as the Chesapeake & Ohio in the long diagonal line of 1,101 miles in length that it stretches across half a continent from the Chesapeake to the Mississippi, from Newport News to Memphis.

W. Va. Coals for New Orleans.—We find the follow- interesting item in a recent number of the Kanawha Gazette of Charleston, W. Va.:—"Nine boxes containing fine specimens of splint, cannel and bituminous coal, have been obtained from the Big and Little Coal river coal banks near Peytona and Boone C. H., and forwarded to the New Orleans exposition. Major Thomas L. Broun assisted the State agent; Phillip Pendleton, Esq., in procuring these coal specimens.

Brick clays.—The best building-brick clays are composed of silica three-fifths, alumina one-fifth, and the remaining one-fifth of iron, lime, magnesia, soda, potash and water; if there is an excess of alumina over the silica the bricks are likely to crack in the kiln, but the presence of a proper proportion of silica remedies this by rendering the bricks more porous, and good building-bricks have been produced when the proportions of silica reached as high as eighty-five per cent of the whole body.

When sand is added to the clay intended for common bricks it should be clean, sharp, fusible and not too fine; right selection and proportion insure a hard, strong, ringing brick of good size and color, but for pressed, ornamental and other higher grades of bricks a finer sand should be used.

To be acquainted with the chemical qualities of brick clays is of course useful in their manipulation, but the physical tests of this class of clays are of vastly more importance. Analyses answer well for comparisons in theory, but the principal trials and results are the ones which govern their employment in industry.

The actual quality of sand or other substances to be employed, and which are required for any clay, can only be determined by actual experimental mixing and burning. Sandy clay or loam, and calcareous clay or marl, are largely used for brick-making; but if too much lime be present the compound becomes too fusible. Oxide of iron is always present in building-brick clays to a more or less degree, and in the process of burning it is converted into peroxide, and imparts to the whole its color, more or less deep red, according to the degree of heat which the brick receives in burning, and the amount of oxide that the clay contains.

Clays that are rich in lime or alkalies are not good for brick-making purposes, and are the worst that can be used for that purpose; in fact, when a clay contains even three per cent of lime, a good quality of brick cannot possibly be made from it.

Carbonate of lime, diffused limestone and lime-pebbles, when they are present in brick-clays, are a decided hindrance to the production of even a passable quality of building bricks, for in the kiln the limestone and lime-pebbles are converted into caustic lime, and when the bricks are used below ground, or for exposed walls, the moisture and carbonic acid, which penetrate to every part of a brick, slack the nodules of lime, the swelling causing the brick to burst and break to pieces. Should such bricks be used for "filling in," or for inside or unexposed walls, the dampness from the mortar used in laying them, and also that contained in the plastering, would, by producing the same bursting and breaking, destroy the finished surface of the inside walls.

These are some of the evils which result from the badly-made bricks so freely used in Chicago, and arise from the large amount of lime-pebbles in the clay, and the neglect of finely pulverizing or thoroughly sifting the clay, which can be done by machinery, at but a small additional cost. Oyster shells and iron pyrites are not uncommonly present in clays, and in order to make a durable and well-colored brick they must be separated from the clay.

Clay taken from the seashore, or without or beneath the sea-washes, or from places in or near salt formations, will not burn into good bricks. Before they receive sufficient heat to burn them into hard bricks they will fuse, warp, twist and agglutinate together upon the surface, and in the arches of the kiln they "run" or melt quickly into unshapely masses of molten clay, and form "burs" or "clinkers."

A very interesting, but unfortunately very little understood, class of phenomena takes place when bricks made from material which we have just considered, or those that contain small quantities of it, are exposed to certain conditions. I mean that the saltpetre exudations which effloresce on the exposed faces of brick walls.

Clays containing a large amount of carbonaceous matter naturally mixed with it are very objectionable, as bricks when made from such clays will, when weted in the wall, pass out soluble compounds, which discolor the walls, whether they are painted or not, and plastering and stucco work are discolored by them the same as when bricks which have once been used on the inside of a chimney-flue, and become blackened, are re-used in new work.

It would be useless to attempt decorative work of any description upon brick walls the materials of which contain a large amount of carbonaceous matter, or if the bricks be made from the alluvial mud of the embouchures of rivers, as no possible precaution can prevent the entire destruction of the work.

The argillaceous earths that are generally suitable for the manufacture of building-bricks may be divided into three classes, viz:

1. Loams, which are light, sandy clays.
2. Pure clays, principally composed of alumina and silica.
3. Marls, which are earths that contain an unusual proportion of lime.

It is not often that earths are found that are suitable *per se* for brick-making; they generally require mixing with something else, as the loams are usually so open that, in order to bind the earth, a flux in the nature of lime has to be added, and if it happens that a loam requires no mixing, the difference in the working of adjacent strata in the same field is so great that in order to produce regularity in the size and color of the bricks, it is necessary to mix and temper two or three different kinds together, and for the same reason, and to prevent "checking," the pure clays also require mixing with some milder earth, loam or sand.

In working marls, great trouble is experienced from skerry or impure limestone, which abounds in marl; for should a very small piece be allowed to remain in the clay, it is certain to destroy the brick into which it finds its way. To obviate these bad results, heavy iron rolls are used to pulverize the marls and the limestone found in them.

No class of clay freshly taken from its bed is in a condition to be at once moulded into tempered bricks even if it be of suitable composition, and it should first be exposed to the action of frost, the water diffused through the substance expanding by freezing, and breaking in every direction.

The longer the exposure is continued, the more effectually is the clay reduced, and the more easily tempered and moulded. But the diging of the clay in the autumn is not alwasy attended to; but to neglect it, however, is to run a great risk of having bricks made by the hand-process unsound, as well as faulty in shape.

Chas. T. Davis, in *American Architect.*

The "Strickler" Iron mines are in Page county, Va., 7 miles north from Luray and 200 yards east of the main track of of the Shenandoah Valley Railroad near Rust siding They are owned and operated by B. C. Rust of Luray.

This mine has been but recently opened; some 500 tons of ore have been sent from it to Pennsylvania furnaces, where it gave satisfaction; it was supplying a furnace at Danville, Pa., when it went out of blast not long since It is especially rich in "wash" ore, a deposit of that kind being there covered by but 3 ft. of dirt; under this is the solid stratified ore in place. An analysis made for the Chickies Iron Co, Chickies, Pa., by J. Blodget Britton, gave: Metalic iron 43 per cent, phosphorus 0.6 and metalic manganese 0.957.

Virginia Minerals for the N. O. Exposition.

(Continued from page 186.)

Below we continue the publication of the list of Virginia's minerals collected by Assistant U. S. Commissioner Jed. Hotchkiss, in charge of ores, minerals, etc., grouped by counties, giving consecutive numbers for those collected from each county followed by the name and address of each contributor and concluding with the general collection number of the commissioner in charge.

Charlotte.

From Va. Dept. of Agriculture:

1. Copper ore. D. A. Claiborne. 185. (618).

Powhatan.

From Va. Dept. of Agriculture:

5. Iron ore and titanium, from Mr. Leake. 186. (619).

Halifax.

From Va. Dept. of Agriculture:

1. Cinder, from old furnace near Scottsburg. 187. (620).
2. Magnetite from John M. Jordan. 188. (621).
3. Corundum (?) from D. A. Claiborne. 189. (622).
4. Steatite and clay, from H. Blair, Wolf Trap. 190. (623).
5. Light sandstone; from H. Blair, Wolf Trap. 191. 624.
6. Magnetite and specular iron ore from J. M. Jordan. 192. (625).

Montgomery.

From Va. Dept. of Agriculture:

9. Lead and zinc ore; metalic lead 32.78 and metalic zinc 24.88, by analysis of A. A. Hayes, State Assayor of Mass.; from Geo. W. Anderson. 193. (626).

10. Silver ore, mispickel or Arsenical pyrite, from W. J. Guerrant. 194. (627).

Botetourt.

From Va. Dept. of Agriculture:

27. Marble, from G. Gray. 195. (628).
28. Red iron ore, from G. Gray. 196. (629).
29. Barytes, from G. Gray. 197. (630).

Giles.

From Va. Dept. of Agriculture:

5. Red iron ore, D. F. Hale, Narrows; metalic iron 68.41 per cent. 198. (631).
6. Spoted marble, from J. H. Hoge. 199. (632).

Wythe.

From Va. Dept. of Agriculture;

45. Oil stone from Little Walker mn., from Col. T. J. Boyd, Wytheville. 200. (633).

46. Ochrous silicate, from Sayers', mouth of Reed creek, on New river. 201. (634).

Amelia.

The following rare specimens, all from the Mica mines near Amelia C. H., are kindly loaned by Mr. W. M. Fontaine, Professor of Geology, Mineralogy, etc., in the University of Virginia.

19. Columbite crystals, a large aggregated mass. 71. (636).

20 Microlite crystals, a large aggregated mass. 72. (637).

21. Monazite, a large crystaline mass. 73. (638).

22. Monazite, partly altered, a large crystaline mass. 74. (639).

23. Microlite, striated hy overlaping plates of Mica. 75. (640).

24. Monazite, aggregated crystals. 76. (641).

25. Albite feldspar, crystals. 77. (642).

26. Albite feldspar, Spessarite, and Helvite. 78. (643).

27. Allanite, a variety of Orthite. 79. (644).

Campbell.

The following were collected by Mr. E. D. Frazier:

2. Iron ore, specular and magnetic, from mine one mile north from Lynch station, Va. Mid. RR., and ¾ mile from railway; owned by T. C. Merritt, Lynch Station p. o., and now worked by Hickson & Co. 1. (674).

3. Magnetic iron ore from mine of E. S. Lee, Otter River Sn. p. o., one mile west from Otter River station, Va. Mid. RR. and 200 yards from railway. This mine was formerly worked by the Pa. Steel Co. 2. (675).

4. Manganese from mine of H. Olivier: Otter River Sn. p. o.; mine 2 miles east from Otter River sn., Va. Mid. RR. Several shafts have been sunk showing a large deposit. 3. (676).

5. Barytes from "Hewitt" mine, owned and worked by Davis & Bro., of Lynchburg, 2 miles N. E. from Otter River station and ½ mile from Otter Bridge switch, Va. Mid. RR. Evington Depot p. o. 4. (677).

6. Soapstone, steatite, from Mrs. C. Peerman's quarry 4 miles east from Otter River station, Va. Mid. RR. This quarry has been sufficiently developed to show that the stone is abundant. Castle Craig p. o. 5. (678).

7. Marble from J. M. Burruss, 2 miles from Otter River station, Va. Midland RR.; abundant but undeveloped. 5½. (679).

8. Manganese, from mine of M. L. Bishop, Lynch Station p. o., 1¼ miles west from Lynch station, Va. Midland RR.; has been proven a good deposit by several shafts. 8. (680).

9. Magnetic and specular iron ore from mine of M. L. Bishop, 1¼ miles west from Lynch station, Va. Midland RR. Pits have been dug to the deposit but the ore has not been worked. 9. (681).

Pittsylvania.

Collected by Mr. E. D. Frazier:

4. Manganese, from property of Mrs. P. Snow, Motley Station p. o., 2 miles north from Motley station, Va. Midland RR. Probably a large deposit, but undeveloped. 6. (682).

5. Limonite, brown iron ore, from mine of Bond & Henderson, Motley station p. o., ½ mile west from Motley station, Va. Midland RR.; was formerlv worked by Lynchburg Iron Co. 7. (683).

6. Magnetic iron ore from Pittsville mine, owned by Shelborne, Pittsville p. o., ¼ mile northwest from Pittsville station, Franklin branch of Va. Midland RR. Branch road to mine which was worked by Pa. Steel Co. 10. (684).

7. Barytes from mine owned and worked by Pittsylvania Mining & Milling Co., Pittsville p. o., one mile west from Pittsville station, Franklin branch Va. Mid. RR. 11. (685).

8. Barytes from mine of Tonner & Bliss, Pittsville p. o., 1¼ miles from Pittsville station of Franklin branch of Va. Midland RR., and one mile from the railway line. 12. (686).

9. Manganese from mine near Pittsville. 12½. (687).

Roanoke.

23. A green stone, resembling serpentine, two varieties, from quarry of Dr. R. B. Hudson, 4 miles south from Roa-

noke city on the Franklin road. Extensively used in Roanoke for sills, caps, &c., in buildings and for steps and curbs; soft, and dresses easily when first quarried, but becomes hard and weathers well. (671).

24. Brick clay and a raw and a burnt brick from brickyard of J. W. Earmon, near Roanoke (672).

Augusta.

32. Argentiferous galena (lead and silver), from land of M. K. Garber on Big Calf-pasture river, Marble Valley Post-office. Good surface outcrop; has not been worked. Analysis by Dr. H. Froehling. (645).

33. Spiegeleisen from Edgar-Thompson Steel Works, Pittsburg, Pa.; made with Manganese from Crimora mine on S. V. RR. in this county. (670).

34. Flagy limestone, from No. III, or Trenton; from Long Glade. A fine building stone; makes good lime. Contributed by Col. S. A. East, Long Glade. (690).

35. Slate, from "Redbud" quarry in Formation No. III, Hudson River, on B. & O. RR., N. E. from Staunton. Good for flagstones, marbleizing, etc. Contributed by Capt. C. A. Holt, Staunton. (691).

36. Bricks, from the brickyard of B. T. Bagby, near Staunton; made from clay of the Silurian of the Shenandoah valley. (709).

Washington.

Contributed by Maj. W. K. Armistead, Abingdon:

8. Plaster, sulphate of lime, one box, from near Saltville. (712).

9. Iron ore, semi-magnetic, from "Golleher" mine, near N. & W. RR. some 5 miles northeast from Abingdon. (713).

10. Iron ore, red, from "Ricketts" mine. (714).

11. Iron ore, red, from Golleher" mine. (715).

12. Iron ore, red, from "Gray" mine, S. fork of Holston river. (716).

13. Iron ore, fossil, dyestone, or Clinton, from Big Moccason gap of Clinch mountain. (717).

14. Brown iron ore, Oriskany, from Clinch mn. (718).

15. Brown iron ore from Potsdam shales. (719).

16. Brown iron ore from Silurian shales of Iron mountain. (720).

17. Manganese, black oxide, from Potsdam shales of Iron mountain. (721).

Grayson.

Contributed by Maj. W. K. Armistead, Abingdon:

8. Magnetite, black oxide of iron. (722).

Russell.

Contributed by Maj. W. K. Armistead, Abingdon:

3. Marble, variegated, from base of Clinch mountain. (723).

4. Bituminous coal from Dump's creek. (724).

5. Coke from Dump's creek coal. (725).

6. Splint coal from Dump's creek. (726).

Wise.

10. Cannel coal from near Pound fork of Big Sandy river. (727).

Franklin.

Collected by E. D. Frazier.

4. Magnetite from "Franklin" mine, ½ m. N. W. from Rocky Mount. Several railway tracks run out to these mines from the Franklin branch of Va. Mid. Ry. Shafts have been sunk and other developments made. The old Franklin furnace used ore from these mines in 1861. The Pa. Steel Co. worked these mines recently and took ore from them to its works at Harrisburg, Pa. Owned by John Hale, of Rocky Mount. 13. (728.)

5. Magnetite, from Capt. C. J. Saunders' mines, 11 ms. S. W. from Rocky Mount. Extensive developments have been made showing a vein of ore 8 ft. thick. A furnace was in blast near these mines in 1861. Owned by Capt. C. J. Saunders, Rocky Mount. 14. (729.)

6. Granite from W. C. Smithers' quarry, one m. N. W. from Rocky Mount and ½ m. from railway to iron mines. Quarry is developed and rock used for curbing and flaging. Owned by W. C. Smithers, Rocky Mount. 15. (730.)

Rockbridge.

48. Manganese, from Guy Run Iron lands of E. A. Packer, of New York city. Mine leased and worked by H. Lerner, Goshen, C. & O. Ry. (731.)

49. Paints, a number of colors, from ochres, etc mined and made by H. Lerner, of Goshen, Va. Mines on slope of Chambers mn. near W. end of Goshen pass. (732.)

50. Tin ore, Cassiterite, from "Mt. Maria" mine, on Irish creek, western slope of Blue Ridge, belonging to A. D. Robertson & R. C. Grant. Irish Creek, p. o. Near line of Shenandoah Valley RR.

Major A. D. Robertson writes us that this ore is from a nearly vertical vein, about 2′ thick, that has been opened at 3 or 4 points and drifted in by a tunnel 80′ long. It yields by analysis 3¼ per cent of metalic tin. Seventeen other veins have been opened and the existence of others is known. This tin ore has been found over an area of 7 miles in length by 1 mile wide. (456).

51. Tin ore, Cassiterite, 200 pounds, from mine of Mrs. Martha D. Cash, Irish Creek p. o. This is from the same region and veins as the "Mt. Maria" ore above described. (738.)

Alleghany.

34. Limonite, brown iron ore, from fine deposit in No. VII, Oriskany, on land of D. A. Kayser, of Staunton, at lower end of Clifton Forge pass, R. & A. RR. (692).

35–39. Limonite, brown iron ore, No. VII, or Oriskany, from cuts 1, 2, 3 and 4, and "washed" ore from the "Stack" mine, near Backbone station of Chesapeake & Ohio Ry. Contributed by Supt. John S. Ham, Backbone, Va.— This mine of which Mr. Frank Lyman, 130 Water St., New York city, is manager, is a very extensive one and has yielded a large quantity of excelent ore. Its present capacity is 200 tons a day; it furnishes ore to Low Moor and other furnaces. (733.)

Norfolk.

Contributed by Richard Lamb, Civil & Sanitary Engineer, Norfolk, Va.

1. Peaty soil of Great Dismal Swamp. (710).

2. Soil of Great Dismal Swamp from vegetable matter. (711).

3. Juniper water of Great Dismal Swamp. (712).

Wythe.

The following are from Old Poplar Camp furnace, in the gap of Poplar-camp mountain, contributed by A. N. Chaffee, owner of the furnace property, Jackson's Ferry p. o.

42. Iron ore, from the Potsdam shales, No. 1, formerly used in Poplar-camp furnace. (548).

43. Sandstone, Potsdam. (549).

44. Limestone, No. II; that formerly used in old Poplar-camp furnace. (550).

48. Managanese, from Guy Run Iron lands of E.A. Packer, of New York city. Mine leased and worked by H. Lerner, Goshen, C. & O. Ry.

49. Paints from Ochres, etc., mined and made by H. Lerner of Goshen, Va. Mines on slope of Chambers mn. near W. end of Goshen pass.

Rockingham.

12. Trap rock, locally called "Ironstone," from a dyke from 40 to 50 feet wide near the Augusta line, 2 ms. southwest from Port Republic, near Leroy village.

This particular block of trap, 2.5 ft. long, 2 ft. wide and 2 ft. high, is an historic one, as it is the block that was used as an "anvil block" for a tilt-hammer in the blacksmith-shop of Selah Holbrook, at Port Republic, and on the anvil that was morticed into this block Selah Holbrook and his son, J. H. Holbrook made, in 1843, the sickles for Cyrus H. McCormick, that were used in the first McCormick reaper or harvester.—Loaned by C. D. Harnsberger, the owner of it, Port Republic, Va. (736).

Nelson.

16. Copper ore, green and blue carbonates, &c. from Rawlings & Amentrout, Staunton, Va. (737).

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19. Limonite, brown iron ore, 3 pounds, from "Beverly" mines of Beverly Ore Co., 320 Walnut St., Philadelphia. Contributed by Supt. J. E. Harvey, Grove Hill p. o, who claims it contains 65 per cent of metalic iron. This mine is near Beverly sn. of Shenandoah Valley RR (737).

Albemarle.

The following were collected by Prof. W. H. Seamon, of the Miller School:

29. Purple roofing slate from Albemarle Slate quarry, 10 ms. S. from Charlottesvile; owned by Sears & Co., Boston, Mass., 24. (740.)

30. Green roofing slate, from same locality as above. 25. (741.)

31. Tile slates; from same locality as above. 26. (742)

32. Marbleized slate, for mantels etc., made at works of above quarry. 27. (743).

33. Iron ore from Stony Point near Va. Mid. Ry.; owned and worked by Maj. Mason, Charlottesville. Ore contains: Iron 52.32, sulphur a trace, phosphorus 0.225 and manganese 0.73 per cent. 28, (744).

34. Iron nodule, showing black velvety surface with crystals of white quartz, from Stony Point. 29. (745).

35. Magnetic Iron ore from Israel mn., N. W. from N. Garden sn. Va. Mid. Ry. 30. (746.)

36. Quartz crystals, from Stony Point. 31. (747).

37. Sandstone from ridge S. of Charlottesville; used for foundation walls of Lewis Brooks Museum, University of Va. 32. (748.)

38. Mica-schist, quarried near gas-works, Charlottesville, for curbstones, etc. 33. (749.)

39. Mica-schist from near Bethel sn. Va. Mid. Ry. 34. (750.)

40 Quartzite from E. flank of Carter mn. 35. (751.)

41. Granite from Dr. Michie's farm near Piney mn. 36. (752.)

42. Syenite from Dr. Michie's farm near Piney mn. 37. (753).

43. Slate, from Slate Hill church, 38. (754).

44. Quartzite, feldspathic, from near Batesville. 39. (755).

45. Hydro-mica schist, from Batesville. 40. (756.)

46. Greenstone with quartz and pyrite from near Powell's 41. (757).

47. Red sandstone conglomerate, at Dyer's Store, Scottsville. 42. (758.)

48. Red sandstone from same as above. 43. (759.)

49. Red sandstone conglomerate, from same as above. 44. (760)

50. Red oxide of iron, from same as above. 45. (761).

51. Coarse felsite from Blue Ridge, at Turk gap. 46. (762).

52. Syenite, from Miller School farm. 47. (763.).

53. Bluish sandstone from E. flank of Carter mn. 48. (764).

54. Syenite containing hydro-mica, from near Brownsville. 49. (765).

55. Gneiss, from Morris' Mill, near Batesville. 50. (766.)

56. Greenstone from Powell's Mill, near Crozet sn. C. & O. Ry. 51. (792).

57. Gneiss, or "calico" rock, from Ivy sn. C. & O. Ry. 52. (767).

58. Felsite, from near North Garden sn., Va. Mid. Ry. 53. (768).

59. Feldspar conglomerate, from Blue Ridge at Greenwood sn. C. & O. Ry. 54 (769).

60. Feldspathic rock, same locality. 55. (770).

61. Epidosyte, same locality. 56. (771).

62. Epidote and calcite, from Blue Ridge at Turk gap. 57. (772).

63 Quartzite, feldspathic, same locality. 58. (773).

64. Hornblende schist, with epidote, quartz and pyrite, same locality 59. (774).

65. Hornblende slate, same locality. 60. (775).

66. Quartz with crystals of epidote, same locality. 61. (776.)

67. Conglomerate, same locality. 62. (777).

68. Chert, same locality. 63. (778.)

69. Puddingstone containing epidote, feldspar and hornblende, same locality. 64. (779).

70. Talcose schist, containing grains of amethystine quartz, same locality. 65. (780).

71. Conglomerate, same locality. 66. (781.)

72. Greenish schist, same locality. 67. (782.)

73. Quartzite, same locality. 68. (783).

74. Quartz, showing jointed structure. 69. (784).

75. Red soil from foot of Southwest mn.; results from decomposition of epidotic rocks. 70. (785).

76. Beded diorite, from Miller School farm. 71. (786).

77. Mica schist, from Miller School farm. 72. (787).

78. Sandy soil from Mechum river bottom lands, Miller School farm. 73. (788).

79. Loam, from hillsides of Miller School farm. 74. (789).

80. Map of Albemarle county, made by pupils of Miller School, showing location of above minerals. 75. (790).

(Continued on page 200.)

Soapstone and Marble.—Mr. Wm. G. Douglas, as manager of Mr. Jacob Veheymier, the veteran stone manufacturer, of Ohio Avenue, Washington, D. C., is now working the Peerman Soapstone quarries and prospecting the Burrus and Oliver marble quarries, near Otter station, Va. Midland Ry.

W. Va. coal to Boston.—There recently passed over the Chesapeake & Ohio Railway a train of 40 cars loaded with coal from the mines of the Black-band Coal & Iron Co., now worked on Davis creek, Kanawha county, W. Va., destined to Boston, Mass. The men interested in this company are most of them Bostonians, and this move indicates an intention to introduce this fine coal into the Boston market.—We have never been able to understand why our West Virginia coals, which are, beyond question, the purest of all the coals of the Apalachian region, *and therefore the best for all purposes*, should not be the coals to everywhere command the markets that they can reach on fair freight rates. It is only a question of developing enterprise enough to bring about this "survival of the fitest" in the use of coals.

The Kanawha Railway, as we learn from the "St. Albans Nonpareil," is now being extended 2 miles farther up Long-bottom branch of Cabin creek of the Great Kanawha (See map in Jan., 1883, No. of *The Virginias*) to where a bed of splint coal has been opened and that will be worked by the Stephens Coal & Coke Co., Mr. Creiger, manager. It says: "This coal is possessed of superior qualities, being very hard, clean, and entirely free from sulphur, the latter feature being prominently favorable, as sulphur is a deadly enemy to grate-bars as well as iron of all kinds."

This railway now runs a train daily for passengers to and and from Coalburg sn. of Chesapeake & Ohio Ry.

Grouped Analyses of Virginia Iron ores.—Below we give a series of analyses of Virginia iron ores grouped by the geological formations from which these ores were obtained:

1. Iron ores from No. 1. the Potsdam.

	No. 1.	No. 2.	No. 3.	No. 4.
Iron peroxide	. .	2.64	79.77	. .
" sesquioxide	. .	51.33	. .	. .
Silica	. .	42.69	6.75	. .
Alumina	. .	1.73	0 80	.
Magnesia	. .	1.93	0.05	. .
Lime	. .	. .	none	. .
Phosphoric acid	. .	. .	0.13	. .
Manganese oxide	. .	. .	trace	trace
Water	. .	. .	12.85	.
Metalic iron	41.41	37.98	55.84	55.20
Phosphorus	0.070	. .	0.06	0.12
Sulphur	none	. .	0.17	. .

	No. 5.	No 6.	No. 7.	No. 8.
Iron peroxide	. .	71.34		. .
Silica	. .	. .	17.67	3.44
Alumina	. .	. .	13.69	. .
Phosphoric acid	1.52	. . .	1.52	. .
Manganese oxide	1.53	0.95	. . .	
Metalic iron	50.54	49.94	40.63	55.46
Phosphorus	1.08	0.66	1.08	0.56
Sulphur	. .	. .	none	.

	No. 9.	No. 10.	No. 11.
Iron sesquioxide	70.00	71.18	. . .
Silica	4.73	10.80	. . .
Alumina	0.86	9.88	. .
Magnesia	trace	. .	. . .
Lime	none	. . .	. . .
Manganese oxide	13.31	trace	. .
Water	11.02	8.02	. . .
Loss, etc	0.18	0.12	. . .
Metalic iron	. .	. . .	60.16
Phosphorus	mere trace.	mere trace.	. . .
Sulphur	none	none	. .

No. 1. From Blue Ridge at C. & O. Ry. tunnel; analysis by O. Wuth.

No. 2. From Blue Ridge, near Mt. Torrey furnace, Augusta county, Va.: analysis by J. W. Mallett.

No. 3. From Fox mountain, Shenandoah Iron Works; analysis by Booth & Garrett.

No. 4. From Bedford Iron Works, Pulaski county, "Clark" ore bed; analysis by Booth & Garrett.

No. 5. From Radford Iron Works, Pulaski county, from Vein 1 at furnace; analysis by Drown & Corliss.

No. 6. From Radford Iron Works, Pulaski county, from Vein 2 at furnace; analysis by Booth & Garrett.

No. 7. From Saw-mill run, E. of Waynesboro, Augusta county; analysis by J. B. Britron.

No. 8. From Saw-mill run, E. of Waynesboro, Augusta county; analysis by H. DuPuy.

Nos. 9. 10. From Shenandoah Iron Works, Page county, from Fox mountain; analyses by W. M. Bowron.

No. 11. From Shenandoah Iron Works, a mile S. W. of Fox mountain; analysis by Booth & Garrett.

2. Iron ores from No. II, the Valley Limestones.

	No. 1.	No. 2.
Iron peroxide	. . .	26.52 Fer. ox.
" sesquioxide	78.66	71.36 Mag. ox.
Silica	5.76	1.83
Alumina	. . .	trace
Magnesia	. . .	0.07
Lime	. . .	0.05
Phosphoric acid	0.450	none
Water	13.62	0.12
Metalic iron	55.00	70.238
Phosphorus	0.240	none
Sulphur	0.160	0.05 SO_3

No. 1. From Fishersville, Augusta county; analysis by J. W. Mallett.

No. 2. From Pearisburg, Giles county; analysis by F. A. Genth.

3. Iron ores from No. V, the Clinton.

	No. 1.	No. 2.	No. 3.
Iron sesquioxide	67.38	. . .	. . .
Silica	19 57	. . .	. . .
Alumina	1.90	. . .	. . .
Magnesia	0.03	. . .	. .
Lime	0.05	. . .	. . .
Phosphoric acid	0.224	. . .	. . .
Manganese oxide,	0.79	. . .	. .
Water	9.61	. . .	. . .
Organic matter,	10.38	. .	. .
Metalic iron	47.16	57.12	41.98
Phosphorus	0.98	. .	. .

	No. 4.	No. 5.	No. 6.
Iron peroxide	77.38	47.965	1.864
" sesquioxide		. .	53.23
Silica	15.96	43.69	38.49
Alumina	3.941	2.130	3.305
Magnesia	trace	0.194	0.317
Lime	0.420	1.230	1.048
Phosphoric acid	0.319	0.575	0.375
Manganese oxide,		.	0.184
Water	2.50	4 00	. .
Metalic iron	54.166	33.575	38 71
Phosphorus	0.140	0.251	0.163
Sulphur	trace	trace	0.084

No. 1. From Roaring Run, Botetourt county; analysis by J. B. Britton.

No. 2. From Clifton Forge, Alleghany county, Fossil.

No. 3. From " " " " . Red shale.

No. 4. From Cumberland Gap, upper bed; analysis by Kentucky Survey, 1877

No. 5. From Cumberland Gap, middle bed; analysis by Kentucky Survey, 1877.

No 6. From Low Moor, Alleghany county, Block ore; analysis by C. E. Dwight.

The Virginia Midland Ry. exhibit at New Orleans of the natural products of the country along its line in Virginia, consisting in the main of minerals, is as follows, arranged by counties. It forms part of the collective exhibit of the Richmond & Danville Railroad system, in charge of Capt. McPhail, at the Exposition. It was collected by Mr. Wm. G. Douglas.

Nelson.

1. Iron ore from one mile from Faber sn.; contributed by Joel Woodson, Orlando p. o. 1.
2. Kaolin from eight ms. from Arrington sn., contributed by Jas. H. Shelton. 40.

Orange.

1. Iron ore, from Madison sn.; contributed by W.P.Hicks, 2 and 3.
2. Iron ore, from Madison sn.; contributed by Reid & Wallace. 11.12.
3. Terra-cotta clay, from Madison sn.; contributed by Reid & Wallace. 13.
4. Yellow ochre, Iron paint, from Madison sn.; contributed by Reid & Wallace. 14.
5. Iron ore, from "Faulkner" land, one mile from Madison sn.; contributed by Glass & Co. 25.
6. Iron ore, from "Taylor" mine, near Orange C. H.; contributed by Erasmus Taylor. 34.
7. Iron ore, from near Orange C. H.; contributed by Ben. Rawlings. 35.
8. Blocks of timber, from Orange C. H.; contributed by Ben. Rawlings. 36.
9. Dried fruit, from Wickliff Scott, Madison sn. 47.
10. Wood, five blocks, from Henderson & Bond, Orange C. H. 53.
11. Hogshead staves, one shook, from R. F. & W. P. Hill, Barboursville. 58.
12. Timber, 27 blocks, from R.F. & W.P. Hill, Barboursville, 52.
13. Timber, 3 pieces, from W. J. Eskew, Madison sn. 54.

Franklin.

1. Iron ore, from Rocky Mount sn.; contributed by W.C Kelly. 4. 5.

Pittsylvania.

1. Iron ore, from Pittsylville sn.; contributed by Hood, of Pa., Steel Co. 6. 7.
2. Baryta from "Bennett" mines, Pittsville sn. 8.
3. Baryta from "Parker" mines, Pittsville sn. 9.
4. Baryta from "Thompson" mines, 2 ms. from Pittsville sn. 10.
5. Kaolin from Ry. Co's. land, Motley sn. 39.
6. Iron ore from Henderson & Bond, ½ m. from Motley sn. 43.
7. Asbestos, from Ry. Co's. land, Pittsville sn. 66.
8. Gray granite, from Breem, 1½ ms. from Dry Fork sn. 69.

Campbell.

1. Iron ore from near Otter River sn.; contributed by Col. L. W. Reid. 15.
2. Iron ore and manganese, from one mile of Lynch sn; contributed by Rev. M. L. Bishop. 16.
3. Soapstone, feldspar, and mica-schist, from 4 ms. from Otter River sn.; contributed by Jacob Veheymier, Washington, D. C. 18.
4. Soapstone, wrought-slab and block, and turned piece, from 4 ms. from Otter River sn.; contributed by Wm. G. Douglas, manager. 19.
5. Baryta from Davis & Co. one mile from Otter River sn. 23.
6. Gray gneiss, a block, from Jas. Breem, Lynchburg, 59.
7. Marble, a block, from Brookes estate, ½ m. from Staunton River sn. 60.
8. Copper sulphuret, from John Morris, 6 ms. from Otter River sn. 61.
9. Iron ore from Richard Oliver, 2 ms. from Otter River sn. 62.
10. Gray stone from Irvin's quarry ½ m. from Lynchburg. 68.
11. Iron ore from Hickson & Wood, one m. from Otter River sn. 72.
12. Pig iron, from furnace of Lynchburg Iron Co., Lynchburg. 38.
13. Building stone from J. D. Langhorne, Lynchburg. 55. 56.

Albemarle.

1. Graphite slate, ¾ m. from Charlottesville, from Wm. G. Douglas, Catletts. 17.
2. Slate, a slab, from Albemarle Slate Co., 6 ms. from Charlottesville. 24.
3. Iron ore, from Stony Point, from Maj. R. F. Mason, Charlottesville. 41. 42.
4. Wine, 3 cases, from Wm. Hotop, Charlottesville. 48, 49, 50.
5. Wine and brandy, one case, from Monticello Wine Co., Charlottesville. 51.
6. Soapstone, a block, from Albemarle Soapstone Co., 5 miles from North Garden sn. 52.

Shenandoah.

1. Manganese, from Powell's Fort M. Co., near Water-Lick sn. 26, 27.
2. Iron ore, from Powell's Fort M. Co., near Water-Lick sn. 28, 29.
3. Calcareous tufa, or travertine marl, one mile from Strasburg; from Wm. G. Douglas and E. D. Fisher. 45.

Fauquier.

1. Iron ore, from Henry Sempers, 4½ miles from Delaplane sn. of Manassas Br., from H. T. Douglas, Catletts. 30, 31, 32.
2. Syenite, rough block, from Alf. Chappelear, 4½ ms. from Delaplane. 57.
3. Paving and sewer blocks, from Eastlake, Catletts sn. 65.
4. Feldspar, or kaolin, from Wm. E. Gaskin, 2 ms. from Warrenton. 66.

Warren.

1. Iron ore from Happy Creek Mining Co., one mile from Happy Creek sn. 33.
2. Limestone from quarry of Carson & Sons, Riverton sn. Burned extensively for lime. 37.

Culpeper.

1. Copper and iron ores from Maj. E. B. Hill, one mile from Culpeper sn. 44.
2. Iron ore from W. S. Wallace, 7 ms. from Brandy sn. 46.

Prince William.

1. Glass-sand from Broad-run sn., from J. O. Blythe. 63.
2. Brown stone, a block, from Lynch's quarry, 2 ms. from Manassas sn. 70.
3. Brown-stone, a block, from quarry of Mayfield Brown Stone Co., ¾ m. from Manassas sn. 71.

(Continued from page 197.)

Campbell.

The following were collected by Mr. E. D. Frazier:

10. Iron ore, magnetic, from "Rosenberger" mine 2½ ms southwest from Lawyers sn., Va. Midland Ry., and one mile from switch. Extensive developments have been made at this mine and 1,800 tons of ore have been mined and shiped to Lynchburg furnace; not now worked. Owned by Henry Rosenberger: Lawyers, Va. 16. (825).

11. Iron ore, specular and magnetic, from B. S. Bernard's, 2 ms. northeast from Lawyers sn., Va. Midland Ry. Deposit undeveloped, but shows a good surface outcrop. Owned by B. S. Bernard, Lawyers, Va. 17. (826).

12. Iron ore, hematite, from "Mortimer" mine 2 ms. southeast from Lawyers sn., Va. Midland Ry., and 1¼ ms. from a switch. Fully developed; 3,500 tons of ore have been mined and shiped to Lynchburg furnace. Owned by James Mortimer, Lawyers, Va. 18. (827).

13. Manganese from E. S. Moorman's, 2½ ms. southeast from Lawyers sn., Va. Mid. Ry. Undeveloped, but shows a large outcrop. Owned by E. S. Moorman, Lawyers, Va. 19. (828).

14. Manganese from "Carson" Mine, 4 ms. south from Lawyers sn. Va. Mid. Ry. and ½ m. from Haden's switch. A shaft has been sunk 30 ft. and 50 tons of ore taken from it and shiped by A. G. Robertson. Owned by James Carson, Lawyers, Va. 20. (829).

15. Quartzite marble, from Lee mn. near Leesville, 6 ms. west from Lynch sn., Va. Mid. Ry. Owned by L. Moon, Leesville, Va. 22. (831).

16. Quartzite marble, a slab 8 feet long, 2 feet wide, and 4 inches thick, from Moon's quarry on Lee mountain 6 ms. west from Lynch sn., Va. Midland Ry., on north bank of Goose creek a half mile above its junction with Staunton river. Undeveloped except for local purposes; slabs and blocks can be quarried of almost any desired thickness, width, or length, from one inch thick upward. Could be conveyed to railway by Staunton river. (See Roger's Geology of the Virginias.) Owned by L. Moon, Leesville, Va. Address S. C. Goggin, Leesville, Va. 23. (832).

17. Barytes, ground, grade No. 1, from mills of Tanner, Bliss & Co., Lynchburg. Ground from Barytes mined in Campbell county. These mills produce about 500 tons of ground barytes monthly. (855).

18. Barytes, ground, grade No. 2, from mills of Tanner, Bliss & Co., Lynchburg. Ground from Barytes mined in Campbell county. (856).

Bath.

5. Ochre, deep red, from deposit on land of Mrs. M. M. Bratton, of Millboro, Va., on Mill creek, near Chesapeake & Ohio Ry.—Contributed by Rev. Samuel Brown, Millboro, Va. (794).

Fauquier.

3. Copper ore, from "Sealock" mine on Blue Ridge, 4 ms. southwest from Linden sn., Manassas branch Va. Midland Ry. Contributed by R. H. Dawson, Clerk of Co. Court of Fauquier Co., Warrenton, Va. (795).

Augusta.

37. Valley Limestone, a dressed block of Building stone from the "Harman" quarry, on the land of Mrs. J. A. Harman, one mile east of Staunton. From Formation No. II. Used in Staunton for architectural purposes. Contributed by Capt. J. C. Marquis, from his marble yard, Staunton, Va. (837).

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20. Ochre, yellow, crude, from mine of Oxford Ochre Co. near Marksville sn. of Shenandoah Valley RR. This mine is in the Potsdam, No. I, shales. Contributed by C. B. Foote, manager, Marksville, Va (798 a.)

21. Ochre, yellow, ground, from mills of Oxford Ochre Co. near Marksville sn. of Shenandoah Valley RR.—About 1,000 tons (6,000 barrels) of this Ochre, from beds at the mills, are ground and shiped to market annually. Contributed by C. B. Foote, manager, Marksville, Va. (798 b.)

Pittsylvania.

Collected by Mr. E. D. Frazier:

10. Barytes, from "Hamner" mine 5 ms. west from Staunton River sn. Va. Midland Ry., on south bank of Staunton river. Extensively worked by Tanner & Bliss, they having mined and shiped to their mill in Lynchburg over 10,000 tons. The mine is now worked; the Rock is boated down to Va. Mid. Ry. Owned by C. V. Hamner, Leesville, Va. 21. (830).

Botetourt.

30. Limestone, ... from quarry of Hon. Corbin M. Reynolds, near Princess furnace, Wilton sn., Richmond & Alleghany Ry.

Analysis by Dr. Hy. Froehling gave:

Lime carbonate	96.800
Magnesia carbonate	1.286
Silica	0.720
Alumina and Iron oxide	0.590
Phosphoric acid	0.024
Organic matter	0.220
	99.640

Contributed by Hon. C. M. Reynolds, Carolina P. O. (835).

31. Limonite, Brown Iron ore, No. VII, or Oriskany, from Callie Furnace ore beds or east slope of Rich-patch mountain, near Wilton sn. of Richmond & Alleghany Ry., and connected by branch railway with Chesapeake & Ohio Ry. near Clifton Forge sn. Used at Callie Furnace situated near the ore beds. Contributed by Hon. C. M. Reynolds, Carolina P. O., Va. (836 a.)

32. Pig iron, from Callie Furnace, made from No. VII, or Oriskany, ores mined near the furnace. (See No. 836 a). This furnace belongs to Hileman, Waring & Co., Clifton Forge, Va. Contributed by Hon C. M. Reynolds. 836 b.)

Alleghany.

35. Limonite, Brown Iron ore, "lumps" from 4 cuts and "washed" ore, from the "Stack" mine.—Frank Lyman, 130 Water St., New York City, manager—, in No. VII., or Oriskany, at foot of eastern slope of Alleghany mn., near Backbone sn., Chesapeake & Ohio Ry. An extensive mine of 200 tons daily capacity; ore ranks as 50 per cent. Contributed by John S. Ham, superintendant, Backbone, Va. (733).

36. Limonite, Brown Iron ore, "lump" and "pipe." No. VII or Oriskany, from "Rumsey" mine, on east slope of Peters mountain near "Mud" tunnel of Chesapeake & Ohio Ry. Contributed by Richey, Brickell & Martin, of Allegheny City, Pa., owners of the mine. (833 a.)

37. Hematite, Specular or Magnetic Iron ore, from "Rumsey" mine on east slope of Peters mn., near "Mud" tunnel of Chesapeake & Ohio Ry. Contributed by Richey, Brickell & Martin, of Allegheny City, Pa., owners of the mine. (833 b.)

Patrick.

Collected by E. D. Frazier:

7. Magnetite, Magnetic iron ore, from "Floyd" mine ¾ mile south from Stella station, Danville & New River RR. Undeveloped but shows a good surface outcrop.—Owned by B. H. Floyd, Spencers, Va. 24. (839.)

8. Hematite, Red Iron ore, from "Moir" mine, ¼ mile north of Patrick C. H., and ½ mile from Stuart sn., Danville & New River RR. Undeveloped, but shows a good surface outcrop.—Owned by Wm. W. Moir, Patrick C. H. Va. 25. (840.)

9. Hematite, Red Iron ore, from "Nowlin" mine, ½ mile northwest from Patrick C. H. and one mile north from Stuart station, Danville & New River RR. Undeveloped, but shows a heavy natural outcrop of ore.—Owned by C. C. Nowlin, Stuart, Va. 26. (841.)

10. Magnetite, magnetic iron ore, from Barksdale furnace property, north of Bull mountain and 15 miles northwest from Martinsville sn., Danville & New River RR. Tunnels run in on the vein of ore for 300 feet show it to be from 5 to 8 feet wide and in great quantity. Fully developed by Pennsylvania Steel Co., of Steelton, Pa., in 1880; 500 tons of ore are now on the dump. A furnace on this property that was in blast in 1862, obtained ore from this mine.—Owned by Jno. P. and E. R. Barksdale, Danville, Va. 27. (842.)

11. Magnetite, magnetic iron ore, from Barksdale furnace property, north of Bull mountain and 15 miles northwest from Martinsville sn., Danville & New River RR. Taken from vein of ore from 5 to 8 feet thick in a tunnel run for 300 feet in the ore.—Owned by John P. and E. R. Barksdale, Danville, Va. 28. (843.)

12. Magnetite, magnetic iron ore, from the "Hairston" mines, north of Bull mn., and 17 miles from Martinsville sn., Danville & New River RR. Mined for use in furnace of Barksdale & Co., in 1862 and in the old Barksdale furnace. Developments show it to be very abundant.—Owned by W. Hairston, Martinsville, Va. 29. (844).

13. Magnetite, magnetic iron ore, from "Forley" mines, one mile south from Smith river and 16 ms. north from Martinsville sn., Danville & New River RR. Mines partially developed and ore used by Saunders & Co. in the old Franklin furnace in 1861. Operations show a good deposit of ore.—Owned by Samuel Forley, Elamsville, Va. 30. (845).

Henry.

Collected by E. D. Frazier:

8. Hematite iron ore from "Gravely" property one mile west from Axton sn., Danville & New River RR., and on line of railroad. Undeveloped but a heavy surface outcrop is seen.—Owned by G. W. Gravely, Axton station, Va. 31. (846)

9. Magnetite, magnetic iron ore, from "E. Davis" property a half mile north from Axton sn., Danville & New River RR. Undeveloped but shows surface outcrop for half a mile.—Owned by Elnathan Davis, Axton station, Va. 32. (847).

10. Magnetite, magnetic iron ore, from "Lucy Davis" property one-fourth mile northwest from Axton sn., Danville & New River RR. Undeveloped; shows good quantity of "float ore.—Owned by Mrs. Lucy Davis, Axton station, Va. 33. (848).

11. Magnetite, magnetic iron ore, from "H. P. Davis" property 1.5 miles northwest from Axton sn., Danville & New River RR. Undeveloped, but shows large amount of surface "float."—Owned by Mrs. Lucy Davis, Axton station, Va. 34. (849).

12. Magnetite, magnetic iron ore, from "McDonald" property, one m. east from Axton sn., Danville & New River RR. Undeveloped, but shows a good surface outcrop. Owned by Mary J. McDonald, Axton station, Va. 35. (850).

13. Mineral, from "Koger" property one m. east from Bull mn, and ten miles west from Spencer sn., Danville & New River RR.—Owned by Woodson Koger, Crews Shop, Va. 36. (851).

14. Mineral, from "Koger" property one mile east from Bull mn., and 10 ms. west from Spencer sn., Danville & New Rivsr RR.—Owned by Woodson Koger, Crews Shop, Va. 37. (852).

15. Steatite, soapstone, from "Gravely" quarry, 2 ms. west from Axton sn., Danville & New River RR. Developed some for local use.—Owned by G. W. Gravely, Axton Sn., Va. 38. (853).

16 Steatite, soapstone, from "Barker" quarry, immediately on line of Danville & New River RR. 2 ms. east from Axton sn. Developed for local use. Very abundant.—Owned by Geo. W. Barker, Axton Station, Va. 39. (854).

Norfolk County.

Collected by Richard Lamb, C. & S. E., Norfolk, Va.

1. Peat, from the Dismal Swamp. (No. 710).
2. Swamp Soil, the natural arable swamp soil of the Dismal Swamp, a product of the decay of vegetable matter.—(No. 711 a).
3. Swamp Soil, from Dismal Swamp land now under cultivation and which produces 50 to 60 bushels of Indian corn (Maize) to the acre. (No. 711 b).
4. Indian corn, Maize, grown on Dismal Swamp soil at rate of 50 to 60 bushels to the acre. (No 711 c).
5. "Juniper water," the purest water of the Dismal Swamp, from spring near Wallaceton on Dismal Swamp canal; noted for retaining its purity during long sea voyages, etc. (No. 712)

All the above, Nos. 1 to 5, were obtained from the farm of Mr. Wallace at Wallaceton.

6. Sandstone, found 18 feet under the surface in Norfolk city in excavating for sewers. (809).
7 Clay, and bricks and tiles made from same, from Geo. Oldfield's brick-yard near Norfolk. (810).
8. Giant Oyster shell, half of one, weighing 6 pounds, from Eastern branch of Elizabeth river, from opposite the hut occupied by Lord Dunmore as his headquarters during the Revolution. This is probably a portion of the largest shell of this kind yet found in the U. S. (857).
9. Fossil crab, found 60 ft. below the surface in excavating for the dry dock at U. S. Navy-yard at Gosport. (858).
10. Singing Sand, from deposit near Ocean View at south end of Chesapeake Bay. (859).
11 Fossil Pine wood, nearly decomposed, found 15 ft. below the surface in excavating for sewers in Norfolk city. (860).
12. Lime, burned from Virginia oyster shells. (861).

Princess-Anne.

Collected by Richard Lamb, C & S. E., Norfolk, Va.

1. Sand, extremely coarse. (862).
2. Sand, very fine (863).
3. Sand, black. (864).
4. Conch shells, light pink in color. (865).

Suffolk.

Collected by Richard Lamb, C. & S. E., Norfolk, Va.

1. Ferruginous sandstone, very rich in iron, from one mile east of Suffolk. (866).
2. Green Marl, incorporated with shells of Chama and Serpula, from 2 ms from Suffolk on Gay's RR. (867.)

3. White Sand of a peculiar texture; called "pure sand" in its locality; emits sparks when struck with steel. (868).

4. White Sand of a peculiar texture; from same locality as No. 868, but does not emit sparks when struck with steel. (869).

5. Blue Marl with fragments of shells; probably rich in lime carbonate; considered locally the best marl for crops. From extreme head-water of Nansemond river. (870.)

6. Yellow Marl, very rich in lime carbonate, and Shells and Nodules from same. (871).

7. Clay and bricks made from same. (872).

Buckingham.

Collected by Mr. E. D. Frazier:

5. Kaolin, from land of M. C. Elcon, 14 ms south from Buckingham, C. H., and 8 ms from Norfolk & Western RR. Appears to be abundant. P. O. Curdsville. 64. (880.)

6. Quartz, micaceous, from Willis mountain. 65. (881).

7. Gold in a molecular state, from land of T. H. Garnett, 6 ms south from Buckingham, C. H. 66. (882).

8. Asbestos, from Willis mountain. 67. (883).

9. Pyrite, iron pyrites, from Willis mountain. 68. (884).

10. Gold-bearing quartz from "Morrow" mine, 6 ms southeast from Buckingham, C. H. 69. (885).

11. Magnetite, magnetic iron ore, from land of Geo. H. Cox, 14 ms south of Buckingham, C. H., and 8 ms from Norfolk & Western RR. Partially developed by Pa. Steel Co. in 1881. 70. (886).

12. Steatite, Soapstone, from land of T. H. Garnett, western base of Willis mountain, 10 ms southeast from Buckingham, C. H.; used locally; appears to be very abundant. P. O., Curdsville. 71. (887).

13. Mineral, from Willis mountain. 72. (888).

14. Kyanite, from Willis mountain. 73. (889).

15. Schorl, from Willis mountain. 74. (890).

16. Copper ore from shaft sunk 80 ft., in 1868, on Willis mountain, on land of T. H. Garnett, Curdsville. 78. (891).

17. Schorl, etc., from Willis mountain. 75. (892).

18. Kyanite, from Willis mountain. 76. (893).

19. Gneiss, from Willis mountain. 77. (894).

20. Micaceous Sandstone, from Willis mountain. 79. (895).

21. Gneiss, with Kyanite, from Willis mountain. 80. (896).

22. Quartz, from Willis mountain. 81. (897).

23. Mica, from Willis mountain. 10 ms southeast from Buckingham, C. H. Surface indications of abundance. Owned by T. H. Garnett, Curdsville. 82. (898).

24. Hematite iron ore from land of T. H. Garnett (P. O. Curdsville), on Willis mountain, 10 ms southeast from Buckingham, C. H. Undeveloped but appears to be in quantity. 83. (899).

25. Quartz crystaline, from vicinity of Willis mountain. 84. (900).

26. Quartz, crystaline, from Mrs. T. H. Garnett's, west from Willis mountain. 85. (901).

27. Quartz, from Willis mountain. 86. (902).

28. Quartz, crystaline, Mrs. T. H. Garnett's, west from Willis mountain. 87. (903).

29. Mineral, from Willis mountain. 88. (904).

30. Gneiss, from Woodson cave, Willis mountain. 89. (905).

31. Ochrous clay, from Willis mountain. 90. (906).

32. Micaceous rock, from Willis mountain. 91. (907).

33. Quartz and Schorl, from Willis mountain. 92. (908).

34. Zircon, from Willis mountain. Shows in great abundance Owned by T. H. Garnett, Curdsville. 93. (909).

35. Garnets, from Willis mountain. 94 (910).

36. Quartz, crystaline, from Mrs. S. A. Hubard's, 3 ms east from Willis mountain. 95. (911).

37. Schorl in Quartz, from John A. Scruggs', a half mile west from Willis mountain. 96. (912).

38. Magnetite, magnetic iron ore, from land of N. B. Shepard (Ca Ira P. O.), 4 ms northeast from Willis mountain and 5 ms west from Ca Ira. Partially developed, showing large amount of ore. 97. (913).

39. Magnetite, magnetic iron ore, from land of P. A. Hubard (Ca Ira P. O.), 2. 5 ms north from Willis mountain. 98. (914.)

40. Kaolin, from Mrs. S.A. Hubard's (Ca Ira P. O.), 3 ms east from Willis mountain. Shows to be abundant. 99. (915).

41. Magnetite, magnetic iron ore, from land of Richard Davis (Curdsville P. O.), 12 ms east from Buckingham, C. H. Partially developed, showing a good deposit. 100. (916).

42. Hematite iron ore, from land of Mrs. S. A. Hubard (Ca Ira P. O.), 3 ms east from Willis mountain. 101. (917).

43. Mica in quartz, from land of John A. Scruggs, ½ m west from Willis mountain. 102. (918).

44. Pyrite, iron pyrites, from land of Mrs. S. A. Hubard, 3 miles east from Willis mountain. 103. (919).

Campbell.

Collected by Mr. E. D. Frazier;

19. Gneiss from land of Mrs. C. S. Peerman, 5 ms east from Lynch station, Va., Midland Ry. Can be quarried any desired thickness. P. O. Castle Craig. 61. (877).

Fluvanna.

Collected by Mr. E. D. Frazier:

3. Gold-bearing quartz, from land of Eugene Payne, 13 ms north from Columbia, Richmond & Alleghany Ry., P.O., Columbia. 62. (878).

Cumberland.

Collected by Mr. E. D. Frazier:

5. Zircon, from land of W. D. Walker on Appomattox river. 9 ms northeast from Farmville. P. O., Farmville. 63. (873).

6. Gray Granite, from land of W. W. Jackson, (Farmville P. O.), 1 m north from Farmville and near Norfolk & Western RR. Used locally; appears to be in great abundance. 104. (874).

7. Bituminous coal, from bed No. 5 of mine of W. W. Jackson (Farmville P. O.), 1 m northwest from Farmville, Norfolk & Western RR. Developed by shaft 60 ft. deep on a good bed of Jura-Trias coal, with sandstone roof and slate floor, diping to northwest. Now mined for local use. 106. (875).

8. Bituminous coal, from bed No. 5 of mine of W. W. Jackson (Farmville P. O.) one mile N. W. from Farmville, N. & W. RR. Partially developed and now worked for local use. Bed of good thickness diping to N. W. 107. (876.)

Craig.

Collected by F. W. Goode:

4. Slate, 4 specimens, from Devonian of No. VIII, from "Custer" quarry on Craig creek, 6 miles south-east from New Castle. (800).

5. Iron ore, large sample, from John Goode's, 4 miles south-east from New Castle. (801).

6. Manganese, 4 large specimens, from "Damewood" mine, 4 miles south-east from New Castle on Craig creek. (802).

7. Manganese, 2 specimens, from J. E. Custer's 6 miles southeast from New Castle on Craig creek. 803).

8. Slate, a large specimen from Devonian slates, No. VIII, from "Jones" quarry on Craig creek 5 miles south-west from New Castle. (804).

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